CLARK FORK RIVER
MACROINVERTEBRATE COMMUNITY BIOINTEGRITY:
1999 ASSESSMENTS

prepared for
Montana Department of Environmental Quality
Planning, Prevention and Assistance Division

prepared by
Daniel L. McGuire
McGuire Consulting

September, 2000

SUMMARY

The Montana Department of Environmental Quality has conducted annual macroinvertebrate surveys in the Clark Fork River Basin since 1986. Each August, we assess biological integrity to evaluate water quality at 25 to 28 sites from the headwaters to Thompson Falls Reservoir. Our analysis was developed specifically for the Clark Fork River drainage and compares each station to a fixed reference condition. The analysis integrates ten measures of macroinvertebrate structure and function into a single index of biological integrity. In addition, metric subsets estimate the relative severity of metals and nutrient/organic pollution. In this report, the 1999 data are analyzed and temporal trends are evaluated. A detailed picture of environmental health and water quality trends over the past 14 years is presented.

Macroinvertebrate-based bioassessments indicate widespread pollution in the Clark Fork River drainage. On a scale of 0 to 100% (with values greater than 90% indicating nonimpairment), individual site assessments have ranged from 13 to 98%. Biointegrity is lowest and severely impaired in upper Silver Bow Creek. Benthic assemblages are much healthier below the Warm Springs Ponds and biointegrity in the upper Clark Fork River is usually classified as slightly (90 to 70%) or moderately (70 to 50%) impaired. Downstream from the Little Blackfoot River, the Clark Fork River is generally slightly impaired. High biointegrity scores indicate excellent water quality in the Little Blackfoot River, Rock Creek, and the Blackfoot River.

Nutrient and organic pollution are the principle cause of biological impairment in most of the Clark Fork River Basin. Nutrient and organic pollution suppress biointegrity throughout the Clark Fork mainstem and in the lower reaches of Flint Creek and the Bitterroot River. Impacts to the benthic community are generally slight. However, moderate impacts are sometimes detected in Silver Bow Creek below the Butte municipal wastewater treatment outfall and below the Warm Springs Ponds. Increased nutrient/organic pollution is also evident in the Clark Fork River near Deer Lodge and from the confluence of the Bitterroot River to Huson. Impacts in the Deer Lodge Valley are primarily attributable to nutrient and organic loads from the Warm Springs Ponds and nonpoint sediment sources and are accentuated by low summer stream flows. Impacts in the lower river are attributed to nutrients from the Missoula WWTP, the Bitterroot River, the Stone Container kraft mill, and groundwater.

Metals pollution has been indicated in the Clark Fork Basin from Butte to Missoula. The degree of metals impairment has varied both spatially and temporally. Severe impacts were evident in upper Silver Bow Creek on all dates. Prior to 1993, slight metals pollution was usually detected in the Clark Fork from the Warm Springs Ponds downstream to the confluence of the Little Blackfoot River and occasionally indicated as far downstream as Missoula. Since 1993, impacts attributable to metals have diminished in the Clark Fork mainstem and have usually been limited to slight impacts from Deer Lodge to the confluence of the Little Blackfoot River. However, metals pollution was more widespread in the Clark Fork River during 1997 when metals caused moderate biological impairment in the lower Deer Lodge Valley and slight impairment downstream to Turah. Increased metals pollution was attributable to elevated metals loading associated with higher peak flows in 1997.

Biological integrity has improved at six stations in the upper basin since 1993. Significant trends are evident in Silver Bow Creek, Warm Springs Creek, and in the Clark Fork River from Warm Springs Creek downstream to Dempsey (CFR0). Improved biointegrity at these sites is primarily attributable to a reduction in metals pollution that coincided with remediation activities at the Warm Springs Ponds, in the Mill-Willow creeks bypass channel, and in the Warm Springs Creek drainage. Recent biological monitoring indicates that water quality declines in the Clark Fork River from the Warm Springs Ponds to Deer Lodge.

In 1999, biointegrity was well above average throughout the Clark Fork River Basin; however, pollution was still indicated at 12 of 28 monitoring stations. Upper Silver Bow Creek remained severely impaired by metals, nutrient, and organic pollution. Only minor reductions in biological integrity were indicated elsewhere in the basin. Blacktail Creek, Silver Bow Creek below the Warm Springs Ponds, and the Clark Fork River from Deer Lodge to the Little Blackfoot River were slightly impaired by nutrient and, to a lesser extent, metals pollution. With only minor exceptions, biological integrity was nonimpaired in the remainder of the Clark Fork (from Warm Springs Creek to Sager Lane and from Bearmouth downstream to the Flathead River). Biological integrity was also nonimpaired in most other tributaries, including the Mill-Willow bypass. Overall, the Clark Fork River Basin appeared to be healthier in 1999 than at any time since monitoring began in 1986.

Mean biointegrity (%) in Clark Fork River Basin stream reaches during August, 1986-1999. Metals and organic scores based on metrics considered most sensitive to each type of pollution.
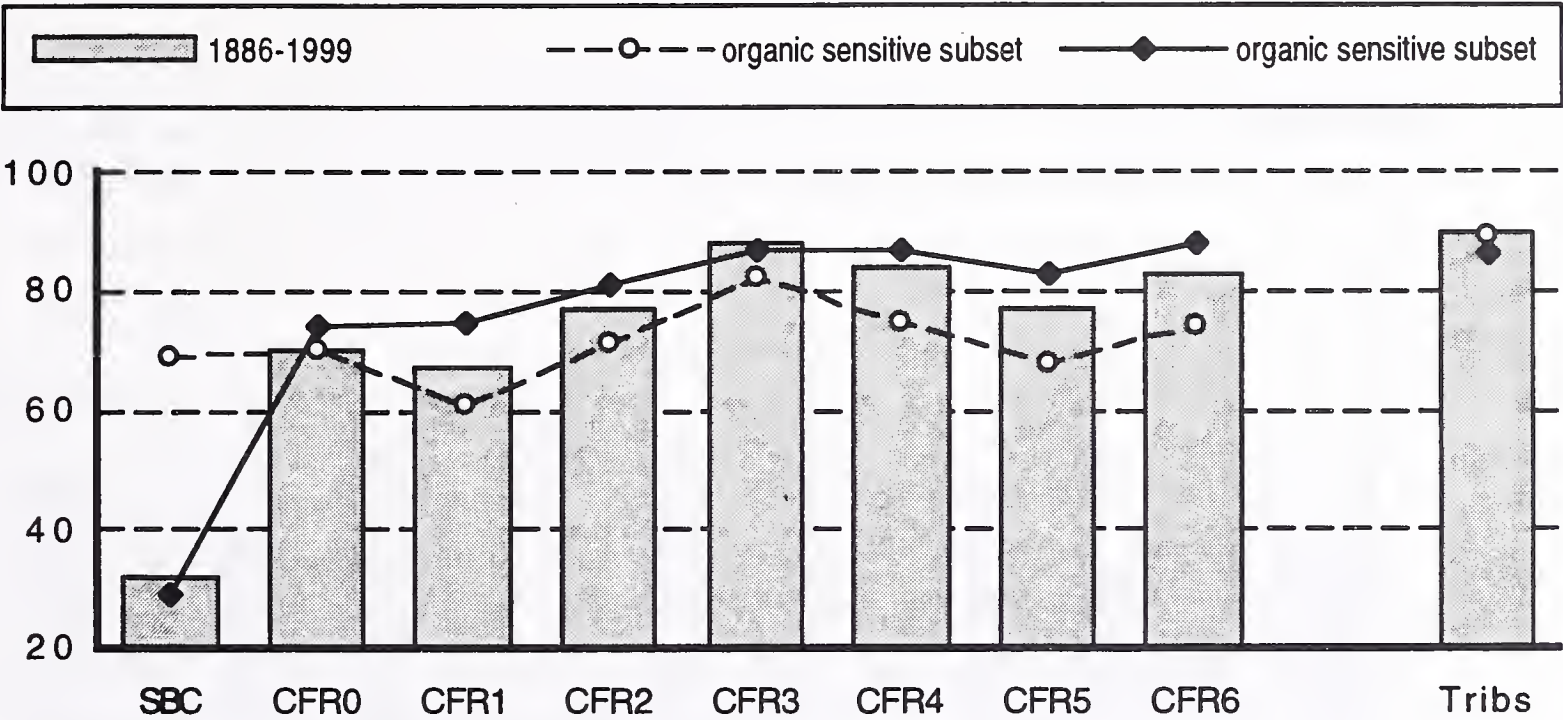
Mean biointegrity (%) in four reaches of the upper Clark Fork Clark Fork River from 1986 through 1992 and 1993 through 1999. Metals and organic scores based on metrics considered most sensitive to each type of pollution.

Stream reaches: SBC = Upper Silver Bow Creek, CFR0 = Warm Springs Ponds to Sager Lane, CFR1 = Deer Lodge to Little Blackfoot River, CFR2 = Little Blackfoot River to Rock Creek, CFR3 = Rock Creek to the Blackfoot River, CFR4 = Milltown dam to the Bitterroot River, CFR5 = Bitterroot River to Alberton, CFR6 =Alberton to the Flathead River, Tribs = Warm Spring Ck., Little Blackfoot R., Flint Ck., Rock Ck., Blackfoot R., and Bitterroot R.

Mean biointegrity (%) in the Clark Fork River Basin during 14 years of monitoring (20 stations; 80 samples per year). Metals and organic scores based on metrics considered most sensitive to each type of pollution.
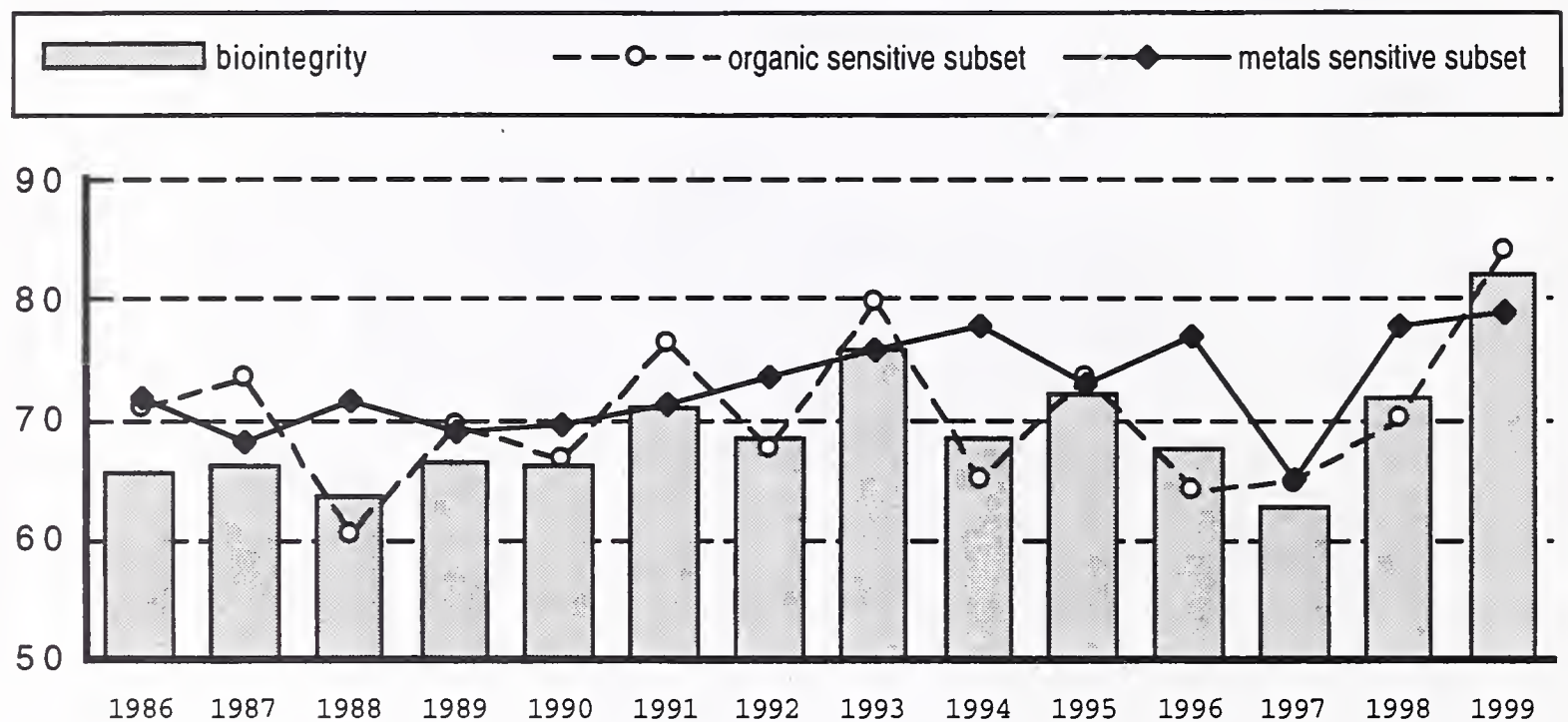
Mean biointegrity (%) in Clark Fork River Basin stream reaches during August, 1986-1998 and 1999.

Stream reaches: SBC = Upper Silver Bow Creek, CFR0 = Warm Springs Ponds to Sager Lane, CFR1 = Deer Lodge to Little Blackfoot River, CFR2 = Little Blackfoot River to Rock Creek, CFR3 = Rock Creek to the Blackfoot River, CFR4 = Milltown dam to the Bitterroot River, CFR5 = Bitterroot River to Alberton, CFR6 =Alberton to the Flathead River, Tribs = Warm Spring Ck., Little Blackfoot R., Flint Ck., Rock Ck., Blackfoot R., and Bitterroot R.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1. INTRODUCTION

The Montana Department of Environmental Quality (DEQ) conducts annual macroinvertebrate surveys as part of a comprehensive environmental surveillance program of the Clark Fork River Basin. In 1986, the program expanded from a water quality study of the lower 230 miles of the Clark Fork River (Ingman 1985) into the headwaters of the Clark Fork Basin. Each August, macroinvertebrates have been collected at 25 to 28 stations along a 300-mile reach from Silver Bow Creek (in the headwaters) to Thompson Falls Reservoir on the lower Clark Fork River. Data from 1999 are presented in this report.

Macroinvertebrates are good indicators of water quality and are commonly used to evaluate environmental impacts to streams. Healthy streams support diverse assemblages of mayflies (Ephemeroptera), stoneflies (Plecoptera), caddisflies (Trichoptera), true flies (Diptera), beetles (Coleoptera) and many others. These organisms provide energy pathways from primary producers (algae) and organic material to consumers (fish, humans, etc.). As integral components of stream ecosystems, macroinvertebrate assemblages reflect the cumulative impacts of all pollutants. Toxic substances, organic pollution, and excessive sediment loading produce characteristic changes in the macroinvertebrate community. These responses can be used to document the type(s) and degree of pollution.

Macroinvertebrate-based assessments can be used to quantify ecosystem health or, its converse, environmental degradation. Biointegrity has been defined as "the capacity of supporting and maintaining a balanced, integrated, adaptive community having species composition diversity and functional organization comparable to that of natural habitat of the region" (Karr and Dudley 1981). This concept has been refined to incorporate both ecological integrity and human values by Meyer (1997) who

describes a healthy stream as "an ecosystem that is sustainable and resilient, maintaining its ecological structure and function over time while continuing to meet societal needs and expectations".

The analysis used in this report was specifically developed for the Clark Fork River Basin. Annual evaluations of aquatic ecosystem health are made at 25 to 28 sites and longitudinal and temporal trends are evaluated (McGuire 1987, 1989a, 1989b, 1993, 1995, 1997, 1998, 1999; McGuire and Ingman 1996). With the inclusion of the 1999 data, a 14-year database exists for trend monitoring at 20 stations. Six other sites have been monitored for at least seven years.

2. STUDY AREA

The study area includes Silver Bow Creek, approximately 267 miles of the Clark Fork River, and the lower reaches of nine tributaries (Figure 1). A station on the Mill-Willow bypass was reestablished in 1999 after a seven year hiatis, bringing the total number of locations sampled in 1999 to 28 (Table 1).

3. METHODS

3.1 Field Work

Since 1986, DEQ staff or contractors have collected benthic organisms with a modified Hess sampler (0.1 sq. meter diameter, 1000 micron mesh netting). During August of each year, four replicate samples were obtained from each station. Sampling methods are described in the DEQ's Field Procedures Manual (1996). At each site, samples were obtained from the richest, most heterogeneous cobble substrates available.

Figure 1
Clark Fork Basin
Monitoring Project

MONTANA

Flathead Lake

Flathead River

THOMPSON FALLS
27

25

24   Clark Fork River

22

20 18   15.5
MISSOULA   14
19   13
Blackfoot River

12   11.7
12.5

11.5   11   Little Blackfoot River
10.2

10
DEER LODGE
09

07
06   04.5
03   00
01   SF-1
BUTTE

Rock Cr.

Flint Creek

Bitterroot River

● Periphyton
Sampling Location

0 10 20 30 40 50

Scale in Miles
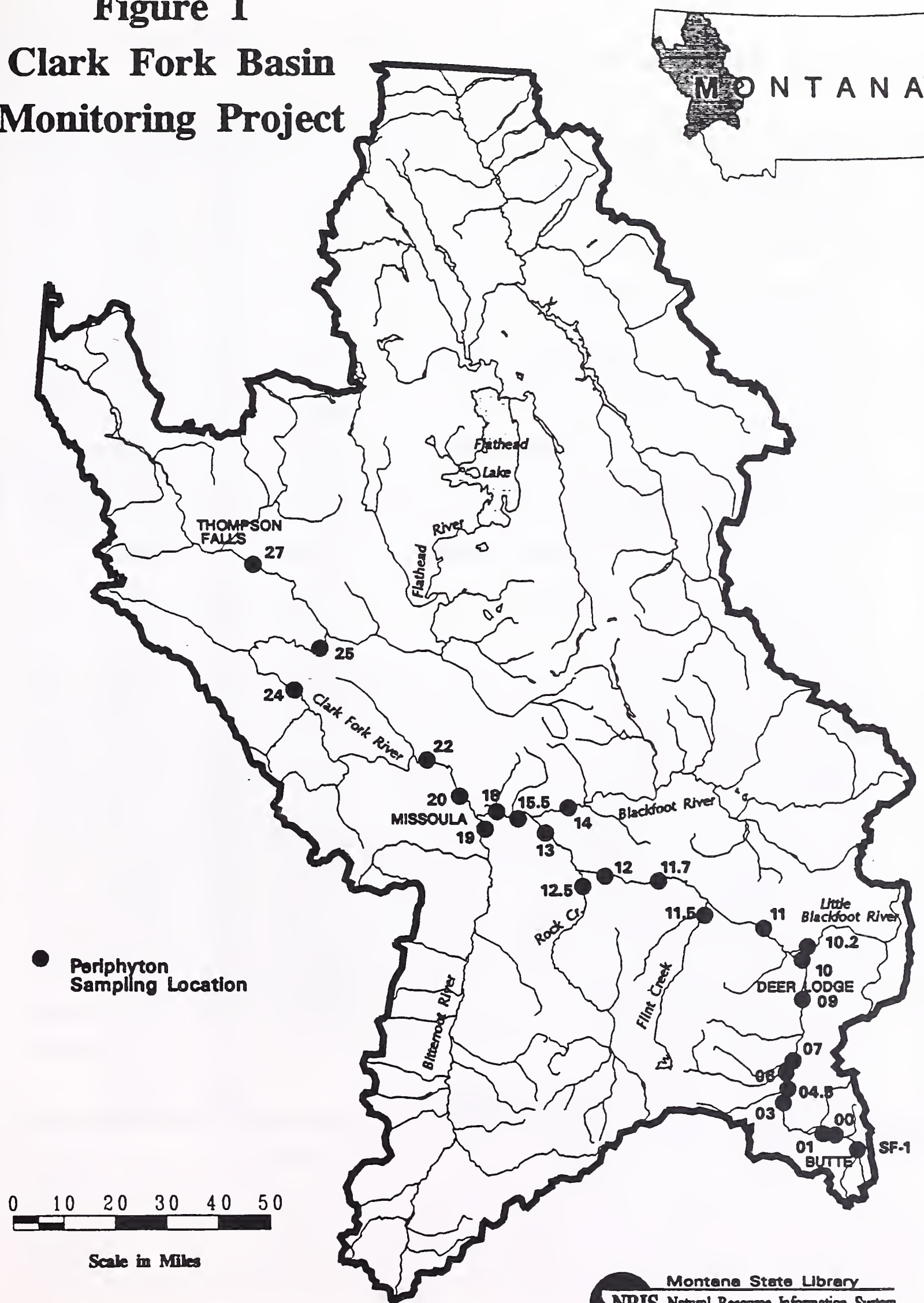
Table 1. Clark Fork Basin biomonitoring sites.

station		name	reach	period of record	
SF-1		Blacktail Creek above Grove Gulch		1993 - 1999	
00		Silver Bow Creek above Butte WWTP	SBC	1987 - 1999	
01		Silver Bow Creek below Colorado Tailings	SBC	1986 - 1999	
02	*	Silver Bow Creek near Ramsay	SBC	1986 - 1992	
02.5		Silver Bow Creek at Opportunity	SBC	1993 - 1999	
03	*	Silver Bow Creek above Warm Springs Ponds	SBC	1986 - 1992	
04	*	Warm Springs Pond #2 discharge		1986 - 1991	
04.5		Silver Bow Creek below Warm Springs Ponds	CFR0	1993 - 1999	
05		Mill-Willow Creeks bypass near mouth		1986 - 1991, 1999	
06		Warm Springs Creek near mouth	TRIB	1986 - 1999	
07		Clark Fork River below Warm Springs Creek	CFR0	1986 - 1999	
08		Clark Fork River near Dempsey	CFR0	1986 - 1992,	1998 - 1999
08.5		Clark Fork River at Sager Lane	CFR0	1990 - 1992,	1998 - 1999
09		Clark Fork River at Deer Lodge	CFR1	1986 - 1999	
10		Clark Fork River above Little Blackfoot River	CFR1	1986 - 1999	
10.2		Little Blackfoot River near mouth	TRIB	1993 - 1999	
11		Clark Fork River at Gold Creek Bridge	CFR2	1986 - 1999	
11.5		Flint Creek at New Chicago	TRIB	1993 - 1999	
11.7		Clark Fork River at Bearmouth	CFR2	1993 - 1999	
12		Clark Fork River at Bonita	CFR2	1986 - 1999	
12.5		Rock Creek near Clinton	TRIB	1993 - 1999	
13		Clark Fork River at Turah	CFR3	1986 - 1999	
14		Blackfoot River near mouth	TRIB	1986 - 1999	
15	*	Clark Fork River below Milltown Dam	CFR4	1986 - 1988	
15.5		Clark Fork River above Missoula	CFR4	1989 - 1999	
16	*	Clark Fork River above Missoula WWTP	CFR4	1986 - 1988	
18		Clark Fork River at Shuffield's	CFR4	1986 - 1999	
19		Bitterroot River near mouth	TRIB	1986 - 1999	
20		Clark Fork River at Harper Bridge	CFR5	1986 - 1999	
22		Clark Fork River at Huson	CFR5	1986 - 1999	
23	*	Clark Fork River near Alberton	CFR5	1986 - 1992	
24		Clark Fork River at Superior	CFR6	1986 - 1999	
25		Clark Fork River above Flathead River	CFR6	1986 - 1999	
26	*	Flathead River near mouth		1986 - 1988	
27		Clark Fork River above Thompson Falls Reservoir		1987 - 1999	

* discontinued stations

4

3.2 Laboratory Analysis

Laboratory processing was consistent with that used in previous years. Samples were rinsed in a U.S. Standard #30 sieve to remove the preservative. A small portion of the sample was placed in a white pan divided into ten equal areas by a grid. All macroinvertebrates were removed and sorted to order. This process was repeated until the entire sample was processed. If the sample clearly contained more than 1000 organisms, subsampling was used to estimate densities of selected abundant taxa (e.g. blackflies or hydropsychids). Samples were processed as usual except that selected taxa were removed from only two randomly selected grids. The number in the subsample was multiplied by five to provide estimated density per 0.1 m^2 Hess sample. Organisms were identified to the lowest level practical, usually genus or species, and enumerated.

3.3 Data Analysis

The analysis was specifically designed to evaluate environmental conditions in the Clark Fork River Basin (McGuire 1993). The analysis incorporates 10 metrics (Table 2) into a single index of biological integrity. The metrics used in the analysis exhibit predicable responses to environmental stress and were the most suitable to the broad range of habitats within the study area. Each metric measured a different aspect of community composition, structure, or function. Since biological communities integrate the effects of all environmental stresses, this analysis provided a reliable evaluation of cumulative impacts from metals, nutrients, habitat degradation, and streamflow alteration.

To evaluate stream health, each metric was assigned a score (0 to 6) based on its comparability to a reference value. Scores for all metrics were totaled and the sum, expressed as a percentage of the maximum possible score, was used as an estimate of biological integrity. The resulting summary score provides a reliable and easily understandable estimate of ecological health.

Metric scoring criteria reflect the range of values in the Clark Fork River Basin from 1986 through 1990. Data from the first three years (1986-1988) of the Clark Fork River Basin study and two years of data (1988-1989) from the Blackfoot River were used to establish metric scoring criteria. For each metric, statistically significant differences among stations were identified by one-way analysis of variance (McGuire 1987, 1989a, 1989b, 1990a, 1990b, Ingman et al. 1989, and unpublished data). Scoring criteria endpoints were defined by statistically distinct groups of stations with the highest and lowest scores. Nonimpaired endpoints were based on stations with the best metric scores and were generally established as the mean minus one standard deviation. On the lower end of the scale, endpoints were generally based on average values of the most severely impaired station(s).

Scoring criteria for some metrics were adjusted to improve the reliability of the assessment. The inclusion of Silver Bow Creek data resulted in wide scoring ranges for most metrics and, consequently, some statistical differences in metric values were not reflected in the scoring criteria. The lower end of the scoring criteria for taxa richness was truncated to provide better discrimination of slight impacts in the Clark Fork River at the expense of detecting slight improvements in Silver Bow Creek. Scoring criteria for percent filterers, Baetidae to Ephemeroptera, Hydropsychinae to Trichoptera, and EPT to EPTC ratio metrics were relaxed to improve the reliability of these metrics over the wide geographic area.

The biointegrity assessment sacrifices some sensitivity to subtle differences to improve reliability. In general, biological integrity in the Clark Fork Basin can be categorized as nonimpaired (90 to 100%), slightly impaired (70 to 90%), moderately impaired (50 to 70%), or severely impaired (<50%). These impairment classifications were less rigorous than statistical differences in the 1986 through 1988 Clark Fork River Basin data. Except for

borderline values, scores in different narrative categories are considered significantly difference from one another.

Macroinvertebrate assemblages exhibit predictable responses to different types of environmental stress; consequently, the sensitivity of individual metrics varies with the type of pollution. Some parameters are useful as estimators of metals pollution while others are more sensitive to organic/nutrient enrichment, excessive sediment deposition, or partial dewatering. Both metals and nutrient pollution are known to degrade water quality and impact aquatic life in the Clark Fork Basin (Ingman and Kerr 1990, McGuire 1990). Therefore, subsets of metrics considered sensitive to these forms of pollution were used to estimate the relative severity of each pollutant (Table 2).

Impacts attributable to metals and nutrient/organic pollutants were estimated by the sum of scores for metrics in each subset, expressed as a percentage of the maximum possible score (usually 18). Metrics comprising the nutrient/organic subset were community density, biotic index, and the percent relative abundance of filter-feeding macroinvertebrates. The subset used to estimate metals pollution consisted of community density, EPT richness, and metals tolerance index.

A specific type of pollution was indicated when the score of one set of metrics was substantially lower than the other. To facilitate interpretation, impacts attributable to these pollutants were categorized as slight (~60 to 80%), moderate (~40 to 60%) or severe (< 40%). The more conservative classification scheme for these metric subsets reflects the limitations of an assessment based on only three metrics. The impairment classifications accurately reflect statistical differences in the 1986 through 1988 Clark Fork River Basin data. Except for borderline values, scores in different narrative categories were considered significantly difference from one another. Metrics and the rationale for their use are described as follows.

Macroinvertebrate Density

Total macroinvertebrate density is an important feature of community structure and, when carefully interpreted, can be a useful indicator of several different environmental conditions. Unusually high or low macroinvertebrate densities are considered indicative of environmental perturbation. Macroinvertebrate density tends to increase in response to organic and/or nutrient enrichment, and the magnitude of the increase reflects the magnitude of the pollution. Conversely, macroinvertebrate density may be reduced by toxic substances such as metals, by severe habitat degradation or by extensive scouring.

Low macroinvertebrate densities were used as an index of metals pollution in the upper Clark Fork River Basin. Specifically, this metric was included to document toxic impacts and provide a measure of biological improvement in Silver Bow Creek. Historically, macroinvertebrates have been absent from or present at very low densities in Silver Bow Creek and the Mill-Willow Bypass (Spindler 1959, Multitech and OEA Research 1986, McGuire 1990b). Increased macroinvertebrate abundance at these sites can be considered a clear indication of reduced toxicity. This metric typically provides little information regarding environmental health in the remainder of the study area.

High macroinvertebrate standing crops were included as a metric to assess nutrient and organic loading in the Clark Fork River. Densities greater than 2,000 per sample (0.1 m^2) were attributed to organic pollution and/or enhanced primary production caused by nutrient enrichment. Given that the threshold value is 2,000 organisms per sample, it is not considered a sensitive measure of organic loading in more oligotrophic tributaries. Because toxic conditions can preclude high macroinvertebrate densities (McGuire 1990b), this metric was not used to evaluate organic/nutrient pollution when density was less than 550 organism per sample. Densities

between 550 and 2,000 organisms per sample received maximum scores for both metrics.

Taxa Richness

Taxa richness, or the number of macroinvertebrate taxa per Hess sample, was probably the single best measure of environmental condition in the Clark Fork River drainage. It is a reliable measure of biological integrity because the loss of the most sensitive species to any stress affects the index. The range for scoring this metric was 14 to 40 taxa per sample. This truncated scoring range maximizes the sensitivity of this metric to small reductions in taxa richness. Mean taxa richness in the lower Blackfoot River during 1988 and 1989 was 41 (Ingman et al 1990 and McGuire 1990a).

Shannon Diversity

Shannon diversity has long been used as an index of environmental condition (Weber 1973) and is a reliable measure of combined environmental stress in the Clark Fork drainage. This index has two components and is influenced by taxa richness and the distribution of individuals among taxa (evenness). Reference stations had an average Shannon diversity value of 3.7 with a standard deviation of 0.4. For this analysis, values greater than 3.3 were considered nonimpaired.

EPT to Chironomidae Ratio (EPT/EPTC)

This metric, originally developed by the EPA (Plafkin et al. 1989), is based on relative abundance of indicator groups. Most Ephemeroptera, Plecoptera, and Trichoptera are considered sensitive to environmental stresses while Chironomidae, as a group, are more tolerant. In the form (E+P+T) divided by (E+P+T+C), this metric ranges from 0 to 1.

An even distribution of individuals among the four groups reflects good biotic condition while a disproportionate number of

chironomids indicates environmental stress. For the Clark Fork analysis, values <0.55 indicate impairment. Using this scale, the EPT/EPTC metric reliably identifies severe biological impairment but does not consistently separate slight, moderate and nonimpaired sites. In some cases, large populations of relatively tolerant EPT taxa (e.g. Baetidae, *Tricorythodes* or hydropsychids) result in high EPT/EPTC values. The % Baetidae of Ephemeroptera and % Hydropsychinae of Trichoptera metrics are included to identify slight to moderate impairment missed by the EPT/EPTC metric.

Percent Baetidae of Ephemeroptera

Members of the family Baetidae are among the most pollution -tolerant mayflies (Hubbard and Peters 1978). Slight to moderate environmental stress is indicated when baetids comprise most of the mayfly fauna. This metric ranges from 0 to 1 with high values (>0.85) indicating biological impairment. This metric received a default value of 1 when no mayflies were collected.

Percent Hydropsychinae of Trichoptera

The subfamily Hydropsychinae is, in general, more tolerant of pollution than most other caddisflies (Harris and Lawrence 1978). Environmental stress is indicated when most of the caddisflies in a sample are *Hydropsyche* and *Cheumatopsyche*. This metric is analogous to the Baetidae/Ephemeroptera metric and ranges from 0 to 1 with high values (>0.85) indicating biological impairment. When no caddisflies were collected, this metric received a default value of 1.

Biotic Index

The biotic index is based on the indicator organism approach to water quality assessment and was developed to measure organic pollution. The index is calculated: SUM ($\%RA_i * t_i$), where $\%RA_i$ is the percent relative abundance of each taxon and t_i is the

tolerance value of the taxon. This index is on a scale of 0 to 10 with higher values indicating more polluted conditions. Tolerance values used in this study (Appendix A) were taken from Hilsenhoff (1987) and McGuire (1992).

Percent Relative Abundance of Filter Feeders

The relative abundance of functional feeding groups can provide useful insights into energy transfer, food resources and organic loading in aquatic ecosystems. Filter feeding insects typically comprise a major component of the summer macroinvertebrate fauna in Montana rivers. Relative abundance greater than 50 percent indicate high seston (suspended organics) concentrations that are usually associated with organic/nutrient enrichment, extensive filamentous algae growth, or lake outflows. This metric is used as a measure of organic pollution in the Clark Fork River Basin. Functional classifications were based on Merritt and Cummins (1984).

EPT Richness

This metric summarizes species richness of Ephemeroptera, Plecoptera, and Trichoptera and was used as an indicator of metals pollution. The majority of mayfly, stonefly and caddisfly species are highly sensitive to pollution. With a few exceptions, species in these groups are among the first to be eliminated by metals toxicity (Wiederholm 1984, Clements 1991). EPT richness averaged 21 among Blackfoot River reference stations. The scoring criteria reflect the wide range of values found within the study area. While minimizing influences of pollutants other than toxins, the wide range reduces the sensitivity of this metric to subtle changes.

Metal Tolerance Index (MTI)

This metric quantifies changes in community composition attributable to metals pollution in the Clark Fork River Basin. The format and calculation are based on Hilsenhoff's biotic index,

with tolerance values assigned to each taxon based on sensitivity to metals rather than organics. The index is calculated: SUM ($\%RA_i * t_i$), where $\%RA_i$ is the percent relative abundance of each taxon and t_i is the tolerance value of the taxon. The theoretical scale of the index is 0 to 10 with higher values indicating communities more tolerant of metals pollution. MTI values for communities dominated by species intolerant of metals are less than 4 (i.e. Blackfoot River) while values for communities composed of only the most metals-tolerant species approach 10 (i.e. Silver Bow Creek). Small, but statistically significant differences in metric values are not reflected in assessment scores due to the wide criteria range necessitated by the inclusion of Silver Bow Creek data.

Metals tolerance values (Appendix A) for most taxa were developed from the 1987 and 1988 Clark Fork River Basin water quality (Ingman and Kerr 1989) and macroinvertebrate (McGuire 1987 and 1989a) data. Ingman and Kerr (1989) quantified metals pollution severity for each station based on the frequency and magnitude of measured copper, zinc, cadmium, and lead concentrations exceeding EPA chronic or acute criteria for the protection of aquatic life. Stations were ranked by metals pollution severity. Macroinvertebrate taxa were ranked according to their relative abundance and distributions along this gradient. Abundant taxa (comprising at least five percent of the fauna at any station) were assigned a rank corresponding to the station where they attained their maximum relative abundance. For less abundant taxa, ranks corresponded to the midpoint of their distribution within the study area. Ranks were transformed to a scale of 0 to 10, rounded to the nearest integer, and used as metals tolerance values. Some tolerance values, particularly for infrequently collected taxa, were modified based on the author's interpretation of pertinent literature (Clements 1991, Clements et al. 1988, Rolin 1988, Wiederholm 1984, Winner et al. 1980, Yasuno et al. 1985, Lynch et al 1988, Leland et al 1989).

Stream Reaches

For some analyses, the study area is partitioned into ecologically distinct stream reaches. These data were used to summarize environmental health in relatively homogeneous river reaches and to evaluate temporal and longitudinal trends using a scale of miles rather than individual sites. In this report, reach boundaries were redefined or renumbered to address changing environmental conditions and sampling locations. Eight stream reaches are currently recognized (Table 1). Reaches vary in length from approximately 10 to 70 miles and currently include from one to four sampling stations. Stream reaches include:

SBC   Upper Silver Bow Creek; from the Colorado Tailing to the Warm Springs Ponds.

CFR0   Lower Silver Bow Creek (below the Warm Springs Ponds) and the upper Clark Fork River downstream to Sager Lane.

CFR1   The Clark Fork River from Sager Lane to the confluence of the Little Blackfoot River.

CFR2   The Clark Fork River from the confluence of the Little Blackfoot River to the confluence of Rock Creek.

CFR3   The Clark Fork River from the confluence of Rock Creek to the confluence of the Blackfoot River.

CFR4   The Clark Fork River from Milltown Dam to the confluence of the Bitterroot River.

CFR5   The Clark Fork River from the confluence of the Bitterroot River to Alberton.

CFR6   The Clark Fork River from Superior to the confluence of the Flathead River.

Trend Analysis

Longitudinal and temporal trends in biological integrity within the Clark Fork River Basin were evaluated at several levels of resolution. Spearman rank correlation (Zar 1974) was used to identify temporal trends in biointegrity. Correlation coefficients (r_S) were calculated to identify temporal trends at individual stations, within stream reaches, and for the study area as a whole. For most stations, analyses were based on 56 samples obtained over 14 years. The fixed reference for all stations and years facilitated this trend analysis.

Table 2. Metrics and criteria used to determine biological integrity in the Clark Fork River Basin.

Metric	Scoring Criteria						
	6	5	4	3	2	1	0
General							
Taxa richness	>39	39-35	34-30	29-25	24-20	19-15	<15
Shannon diversity	>3.3	3.3-3.0	2.9-2.6	2.5-2.2	2.1-1.8	1.7-1.4	<1.4
EPT/EPTC	>.54	.54-.45	.44-.35	.34-.25	.24-.15	.14-.05	<.05
Hydropsychinae/Trichoptera	<.85	.85-.87	.88-.90	.91-.93	.94-.96	.97-.99	1.00
Baetidae/Ephemeroptera	<.85	.85-.87	.88-.90	.91-.93	.94-.96	.97-.99	1.00
Organic pollution subset							
Density	550-1999	2000-2599	2600-3199	3200-3799	3800-4399	4400-4999	>5000
Biotic index	<4.0	4.0-4.5	4.6-5.1	5.2-5.7	5.8-6.3	6.4-6.9	>6.9
% Filterer	<51%	51-55%	56-60%	61-65%	66-70%	71-75%	>75%
Metals pollution subset							
Density	>549	549-450	449-350	349-250	249-150	149-50	<50
EPT richness	>21	21-18	17-14	13-10	9-6	5-2	<2
Metals Tolerance Index	<4.0	4.0-4.9	5.0-5.9	6.0-6.9	7.0-7.9	8.0-8.9	>8.9

All values are per 0.1 m2 Hess sample. Each metric was scored from 0 (severe impact) to 6 (no impact).
Biointegrity was estimated as the sum of metric scores divided by the maximum possible score.

Numerical criteria for the assessment of biologically significant environmental degradation.

classification	% biointegrity	metric subsets indicating metals or organic pollution
nonimpaired	>90%	>80%
slightly impaired	70-90%	60-80%
moderately impaired	50-70%	40-60%
severely impaired	<50%	<40%

15

4. RESULTS AND DISCUSSION

Appendix A contains tolerance values for 202 macroinvertebrate taxa found in the study area since 1986. Identifications, organism counts, metric values and summary statistics for 1999 are presented in Appendix B. For each station, mean metric values, metric scores, and percentage biointegrity assessments were calculated for each year that data were available (Appendix C).

4.1 Stream Discharge

Both peak flows and mean August discharge were about average throughout the drainage in 1999 (Table 3).

4.2 Community Composition and Structure

Macroinvertebrate assemblages were more varied and complex in 1999 than in previous years. Taxa richness, EPT richness, and Shannon diversity were above average for all stream reaches (Table 4). Community density was above average in the upper Clark Fork River but below average in the lower river and in tributaries. Macroinvertebrates were more abundant in the Clark Fork River from the Warm Springs Ponds to Rock Creek (CFR0-2) than in downstream reaches (CFR3-6) or in tributaries.

Community composition varied throughout the study area. While blackflies and *Hydropsyche occidentalis* were the most abundant and wide spread taxa, 13 additional taxa were numerically dominant at one or more sites. *Hydropsyche occidentalis* was less abundant than normal throughout much of the study area and was numerically dominant at only 4 sites (stations 09, 11.5, 11.7, and 12). Other caddisflies, midges, mayflies, and beetles comprised a larger percentage of the community than in most years. The scud, *Hyalella azteca*, was the most numerous macroinvertebrate in Silver Bow Creek below the Warm Springs Ponds (station 04.5) and the mayfly, *Tricorythodes minutus*, was abundant throughout the upper

Clark Fork (CFR0-2). Diptera and caddisflies typically comprised 60 to 80% of the benthic fauna.

Community composition also varied among Clark Fork River tributaries. Macroinvertebrate assemblages in Silver Bow Creek above the Warm Springs Ponds (SBC) were dominated by pollution tolerant chironomids and were characterized by low diversity and taxa richness (Table 4). A few baetid mayflies were present above the Butte WWTP (station 00); however, mayflies, stoneflies and most caddisflies were essentially absent from upper Silver Bow Creek. Silver Bow Creek below the Butte WWTP (station 01) supported a large population of *Tubifex tubifex*. Other tributaries, including the Mill-Willow bypass (station 05), supported rather sparse macroinvertebrate assemblages typified by high EPT richness and diversity.

4.3   Community Biointegrity during 1999

The overall affect of water quality on macroinvertebrate assemblages was estimated from the composite score of 10 metrics (Table 2). For discussion purposes, bioassessment scores were categorized as nonimpaired (90 to 100%), slightly impaired (70 to 90%), moderately impaired (50 to 70%), or severely impaired (<50%).

Biointegrity was nonimpaired at 15 of 28 monitoring sites in 1999. Nine sites were slightly impaired while three stations were severely impaired (Figure 2). Bioassessment scores (Table 5) ranged from 33% at Silver Bow Creek below the Colorado Tailings (station 01) to 98% in the Clark Fork River at Turah (station 13). All three sites in upper Silver Bow Creek were severely impaired. Blacktail and Flint creeks (stations SF-1 and 11.5, respectively) were classified as slightly impaired in 1999. Slight biological impairment was also indicated in Silver Bow Creek below the Warm Springs Ponds (station 04.5), and in the Clark Fork River from Sager Lane to the Gold Creek Bridge (stations 08.5, 09, 10, and 11). Three stations in the middle and lower reaches of the Clark Fork (stations 22, 25, and 27) were also classified as slightly

impaired. All other Clark Fork River stations and tributaries were nonimpaired in 1999.

Benthic macroinvertebrate assemblages were relatively healthy throughout the Clark Fork River Basin in 1999. Biointegrity scores were higher than the long-term average for 26 stations (Figure 3). Flint Creek (station 11.5) and Rock Creek (station 12.5) were the only sites were the 1999 biointegrity estimate was lower than average. For all stations combined, biointegrity averaged 85% in 1999. From 1986 through 1998, annual mean biointegrity for the study area averaged 72% and ranged from 67 to 77%.

Based on mean stream reach values, biological impairment was confined to the upper reaches of the study area (Figure 4). Silver Bow Creek above the Warm Springs Ponds (SBC) was severely impaired while the Clark Fork River from the Warm Springs Ponds to the confluence of Little Blackfoot River (CFR0 and CFR1) was slightly impaired. All five Clark Fork River reaches below the confluence of the Little Blackfoot River were nonimpaired in 1999 (Figure 3).

4.3.1   Metals Pollution

Metals pollution was indicated at only a few stations in 1999 (Figure 2). Composite scores for metals-sensitive metrics ranged from 22 to 100% (Table 5). Moderate to severe metals pollution was evident in Silver Bow Creek above the Warm Springs Ponds (SBC: stations 00, 01 and 02.5). Scores for this metric subset averaged 39% for the three stations on upper Silver Bow Creek (Figure 4). Slight biological impairment due to metals was indicated in Blacktail Creek (SF-1), in Silver Bow Creek below the Warm Springs Ponds (station 04.5) and in the Clark Fork River from Deer Lodge to the confluence of the Little Blackfoot River (CFR1: stations 09 and 10). However, impacts consistent with metals pollution were less evident at these sites than in past years and metric subset scores for the lower Silver Bow and Clark Fork sites were just below the nonimpaired threshold (80%). A strict

interpretation of the assessment criteria also indicted slight metals impacts in the Clark Fork at Huson (station 22) and in Flint Creek (station 11.5).   However, these classifications may have been spurious.   The relative low metals subset score for Flint Creek was probably due to poor sampling conditions following a thunder storm rather than metals pollution.   Relatively low metals subset scores at the Huson site may be due to channel instability and lack of good samplings sites.

4.3.2   Nutrient and Organic Pollution

The macroinvertebrate bioassessment indicated only slight organic and/or nutrient pollution in Silver Bow Creek and the Clark Fork River during 1999 (Figure 2).   Scores for the metrics most sensitive to these pollutants ranged from 61 to 100% and indicated biological impairment at 6 stations (Table 5).   Silver Bow Creek, above and below the Warm Springs Ponds (stations 00, 01 and 04.5, respectively), the Clark Fork River from Deer Lodge to the confluence of the Little Blackfoot River (stations 09 and 10), and the Clark Fork River above the confluence of the Flathead River (station 25) were the only sites where nutrient/organic enrichment was indicated.

Nutrient/organic pollution appeared to be the primary cause of reduced biological integrity in Silver Bow Creek below the Warm Springs Ponds (station 04.5) and in the Clark Fork mainstem during 1999.

4.4   Long-term Monitoring

4.4.1   Clark Fork Basin Tributaries

Community-based assessments provide an overview of water quality at 12 stations on nine Clark Fork River tributaries.   The period of record varies among sites (Table 1).   Based on mean values over the past seven years (Figure 5), the types and severity of pollutants varied substantially among streams. Blacktail Creek was moderately impaired by a combination of

metals and nutrient/organic pollution. Silver Bow Creek above the Warm Springs Ponds (SBC) was severely polluted by metals and varying degrees of nutrient/organic pollution. Silver Bow Creek below the ponds (station 04.5) was impaired due to moderate organic pollution and slight metals pollution. Warm Springs Creek was occasionally impaired by slight metals pollution. Excellent water quality was indicated in the Little Blackfoot River, Rock Creek, and the Blackfoot River. In most years, Flint Creek and the Bitterroot River were slightly impaired by nutrient/organic pollution.

Long-term monitoring has detected significant improvements in five tributaries to the Clark Fork River (Table 6). Improved biointegrity in Warm Springs Creek (station 6), and in Silver Bow Creek above the Butte WWTP (station 00) and below the Warm Springs Ponds (station 04.5) was attributed to reduced metals pollution (Table 7). Improved water quality in the reconstructed Mill-Willow Bypass was also indicated. Higher biointegrity in the Blackfoot and Bitterroot rivers since 1986 was primarily attributable to recovery from drought induced stresses.

4.4.2   Clark Fork River

Long-term data (5 to 14 years) were evaluated for 17 Clark Fork River stations in seven stream reaches (Table 1). Silver Bow Creek below the Warm Springs Ponds (station 04.5) is included in this analysis.

Biological integrity has improved in much of the upper Clark Fork River in recent years (Summary Figure 2). The upper reaches of the Clark Fork River (CFR0 and CFR1) were moderately impaired prior to 1993. However, since 1993, the reach immediately below the Warm Springs Ponds (CFR0) has been only slightly impaired. The Clark Fork from Deer Lodge to the confluence of the Little Blackfoot River (CFR1) has usually remained moderately impaired. On average, biological integrity has been slightly impaired in downstream reaches (CFR2 through 6). Biointegrity was slightly lower in the Clark Fork River from the confluence of

the Bitterroot River to Alberton (CFR5) than in adjacent Clark Fork River reaches.

Based on long-term averages, most Clark Fork River stations were classified as slightly impaired (Figure 3). Lower Silver Bow Creek (station 04.5) and the Clark Fork at Deer Lodge (station 09) were, on average, moderately impaired. Biointegrity tended to be lower from Bearmouth to Bonita (stations 11.7 and 12) and from Harper Bridge to Alberton below Missoula (stations 20 and 22) than at adjacent stations. Mean biointegrity was generally highest (>80%) in the Clark Fork River at Sager Lane (station 08.5), at Gold Creek (station 11), from Rock Creek downstream to the confluence of the Bitterroot River (stations 13, 15.5 and 18), and from Superior to the confluence of the Flathead River (stations 24 and 25).

In recent years, impacts attributable to metals pollution have usually been slight and confined to reaches above the confluence of the Little Blackfoot River (Table 7). However, in 1997, metals caused moderate biological impairment in the lower Deer Lodge Valley (CFR1) and slight metals related impacts were indicated from the confluence of the Little Blackfoot to Turah (CFR2 and CFR3).

Biointegrity has improved over time at four sites in the upper Clark Fork River (Table 6). Significant trends of increasing biointegrity were evident at the first three sites below the Warm Springs Ponds (stations 04.5, 07, and 08) and at Turah (station 13). Metals pollution, as measured by the metals-sensitive metric subset, diminished over time at each of these sites (Table 7).

4.5 Site-Specific Assessments

4.5.1   Blacktail Creek (station SF-1)

Blacktail Creek above Grove Gulch has been monitored since 1993 and was slightly impaired (80%) in 1999. Biointegrity has

averaged 69% during the 7-year monitoring period with slight to moderate impacts occurring on all dates (Figure 6). Biological integrity was depressed by the combined affects of poor habitat and water quality. Benthic habitat was limited due to sand scouring and embeddedness. Slight metals pollution was indicated all seven years while nutrient/organic pollution was indicated each year except 1994, 1998, and 1999.

4.5.2   Silver Bow Creek above the Butte WWTP (station 00)

Although biointegrity remains severely impaired, significant trends of improved biointegrity and decreased metals pollution are evident at this site (Tables 6 and 7). The 1999 biointegrity estimate (41%) was substantially higher than the long term average (29%) and the metals subset score (44%) was the highest recorded at this site during 13 years of monitoring (Figure 7). Mayflies, stoneflies and caddisflies were collected at this site again in 1999, but at lower numbers than during the previous three years.

4.5.3   Silver Bow Creek below the Colorado Tailings (station 01)

Silver Bow Creek below the Colorado Tailing and the Butte WWTP remains severely polluted (Figure 8). The 1999 biointegrity estimate (33%) was somewhat higher than the 14-year average of 24%. Severe metals pollution and moderate to severe nutrient and organic pollution combine to make this site the most impaired in the study area. In 1999, the benthic macroinvertebrate assemblage was comprised of blackflies, Orthocladiinae midges, and tubificid oligochaetes.

4.5.4   Silver Bow Creek at Opportunity (station 02.5)

Silver Bow Creek at Opportunity continued to be severely impaired by metals pollution in 1999. Biointegrity was estimated at 50% with a metals subset score of 22%. Data from stations 03 (discontinued after 1992) and 02.5 were used to evaluate temporal trends in lower Silver Bow Creek (Figure 9). This reach

has been classified as severely impaired each year except 1994 and 1996. Biointegrity has averaged 44% during the past 14 years.

4.5.5   Silver Bow Creek below the Warm Springs Ponds (station 04.5)

Water quality continues to improve in Silver Bow Creek below the Warm Springs Ponds. The 1999 biointegrity estimate (83%) and the metals subset score (78%) were the highest recorded at this site during 14 years of monitoring. Biological integrity was only slightly impaired in 1999. While slight metals impacts are still indicated, organic loading from the pond outflow appears to be the principal factor limiting biological integrity at this site.

Prior to 1993, Silver Bow Creek below the ponds was severely impaired by metals, nutrients and organics. However, metals pollution has been reduced in recent years and biointegrity has improved significantly (Figure 10). As metals-related impairment diminish, taxa and EPT richness continues to rise (Appendix D-5). The scud, *Hyalella azteca*, was the most numerous macroinvertebrate in the 1999 collections from this site.

4.5.6   Mill-Willow Creeks bypass (station 05)

Sampling of the Mill-Willow bypass was resumed in 1999 after a six year hiatus. From 1986 through 1992, metals impacts were evident and the stream was moderately impaired (Figure 11). Impacts were more evident during and immediately following tailings removal and channel reconstruction (1990-1992) then in previous years (McGuire 1993). Subsequent colonization and recovery of the macroinvertebrate assemblage was documented by R2 Resource Consultants (1999). In 1999, we resumed monitoring at the R2 site designated MW-2.

In 1999, the Mill-Willow bypass supported a diverse macroinvertebrate fauna and was characterized as nonimpaired (97%). These results were similar to those reported by R2

(1999) for 1998. EPT richness was more than double the values recorded prior to remediation and all metrics showed improvement (Appendix C-6).

4.5.7   Warm Springs Creek (station 06)

Biological integrity was estimated at 95% in Warm Springs Creek during 1999 and has been classified as nonimpaired each year since 1996. Metals pollution was indicated during most years prior to 1996 and resulted in moderate impairment in 1986 and 1987 (Figure 12). Nutrient/organic pollution has not been detected in Warm Springs Creek. Low stream flow precluded quantitative sampling in 1992.

4.5.8   Clark Fork River below Warm Springs Creek (station 07)

Biointegrity continues to improve at the uppermost station on the Clark Fork River (Figure 13) and was nonimpaired (94%) in 1999. From 1986 through 1992, this site was moderately impaired and had the lowest biointegrity (60%) in the Clark Fork River. Since reclamation and restoration activities in the Warm Springs Ponds, Mill-Willow Bypass, and Warm Springs Creek were completed in 1993, biological integrity (Table 6) has increased while metals pollution (Table 7) and nutrient/organic pollution (Table 8) have declined. Biointegrity has generally been slightly impaired since 1993, but was classified as nonimpaired in 1997 and 1999. Metals pollution was detected at this site on all dates prior to 1993, but has been indicated only once (1995) in the past seven years.

4.5.9   Clark Fork River near Dempsey (station 08)

Water Quality in the Clark Fork River near Dempsey has improved significantly in recent years (Figure 14). This site was moderately to slightly impaired by metals and nutrient pollution from 1986 through 1992. During this time, biointegrity averaged 74% and the mean scores for the metals and nutrient/organic subsets were 74% and 80%, respectively. This site was not sampled again until

1998 when it was classified as slightly impaired due to
nutrient/organic pollution. The Clark Fork at Dempsey was
categorized as nonimpaired (91%) in 1999. Metals pollution has
not been indicated since monitoring was resumed in 1998.

4.5.10.   Clark Fork River at Sager Lane (station 08.5)

The Clark Fork River at Sager Lane was sampled from 1990 to
1992 and in 1998 and 1999. Biological integrity has been
relatively high at this site on each date. Biointegrity has ranged
from 88 to 91% and significant impairment has not been evident
(Figure 15).

4.5.11   Clark Fork River at Deer Lodge (station 09)

The Clark Fork River at Deer Lodge has been moderately impaired
during 10 of the last 14 years. Biointegrity was slightly impaired
(75%) in 1999. As during most previous years, both metals
(78%) and nutrient/organic pollution (67%) were indicated in
1999. On most dates, nutrient/organic pollution appeared to
have the greater impact on biointegrity (Figure 16). The
nutrient/organic subset score has exhibited a slight, but
statistically significant, negative temporal trend (Table 8). The
Deer Lodge site has had the lowest average biointegrity (63%) in
the Clark Fork River over the past seven years.

4.5.12   Clark Fork River above Little Blackfoot River (station 10)

Biological integrity in the Clark Fork River above the Little
Blackfoot was slightly impaired (77%) in 1999. Both
nutrient/organic pollution (61%) and metals pollution (78%)
were indicated. However, the 1999 assessment scores were
higher than the 14-year average for this site (biointegrity 70%;
metals subset 75%; nutrient/organic subset 63%)

This site has been classified as slightly to severely impaired
during all 14 years of monitoring (Figure 17). Slight metals
pollution and slight to moderate nutrient/organic pollution were

routinely detected. The 1997 biointegrity estimate (48%) and the metals subset score (44%) were the lowest recorded at any Clark Fork River site since monitoring began in 1986 (Tables 6 and 7).

4.5.13   Little Blackfoot River (station 10.2)

Biological integrity was nonimpaired (95%) in the Little Blackfoot River during 1999. Mean biointegrity during the past seven years has been 92% and indicates excellent water quality. No trends in biointegrity were evident (Figure 18).

4.5.14   Clark Fork River at Gold Creek Bridge (station 11)

Biological integrity was classified as slightly impaired (88%) at the Gold Creek Bridge site in 1999. However, neither the nutrient/organic or metals subset scores (both 83%) indicated significant water quality limitations. Similar results were obtained in 1986, 1989, 1991, and 1995 (Figure 19). This site appears susceptible to excessive sand deposition, and slight reductions in biointegrity scores may reflect unstable habitat conditions (McGuire 1989b). With regard to water quality, this is usually one of the healthiest sites on the upper Clark Fork River. Since 1986, biointegrity has averaged 83% while the mean metals and nutrient/organic subset scores have been 82 and 78%, respectively.

4.5.15   Flint Creek (station 11.5)

Biointegrity was estimated at 83% and classified as slightly impaired in Flint Creek during 1999. The metals and nutrient/organic subset scores were, respectively, 67 and 83%. Biointegrity was slightly below average in Flint Creek during 1999. From 1993 to 1998, mean biointegrity was 86%. Nonpoint source nutrient and sediment pollution have been indicated on most dates (Figure 20). The nutrient/organic metric subset averaged 77% while metals pollution (mean 90%) had not been previously indicated.

The 1999 results may have been influenced by poor sampling conditions and recent bridge construction at the New Chicago crossing. Samples were collected shortly after a thunder storm, when the stream was quite turbid and relatively high.

4.5.16   Clark Fork River at Bearmouth (station 11.7)

The Clark Fork River at Bearmouth has been monitored since 1993 and was nonimpaired (94%) in 1999. Nutrient pollution was clearly indicated from 1994 through 1997 (Figure 21). Metals pollution was indicated at this site only once (1997) during the 7-year monitoring period.

4.5.17   Clark Fork River at Bonita (station 12)

The Bonita site was nonimpaired in 1999. Biointegrity was estimated at 97%, the highest score for this site during the 14-year monitoring period and well above the long-term average of 71%. This is the first time since monitoring began that this site has been categorized as nonimpaired (Figure 22). Slight to moderate nutrient/organic pollution has been indicated during 11 of the past 14 years. Slight metals pollution was indicated during four years between 1986 and 1992 but has been indicated only once (1997) since that time.

4.3.18   Rock Creek near Clinton (station 12.5)

Biological integrity was nonimpaired in Rock Creek on all seven dates sampled (Figure 23). Biointegrity scores have averaged 93% and consistently indicated excellent water quality. The 1999 biointegrity estimate was 90%.

This sampling site was moved upstream approximately 1/3 mile in 1999 because the parking access site to the old site was blocked. Samples were collected from riffle habitat at the downstream end of a mid-channel bar. There was more sand deposition at this site than at the original sampling location. The

samples contained relatively high numbers of chironomids but included a very diverse mayfly and stonefly fauna.

4.5.19   Clark Fork River at Turah (station 13)

The 1999 biointegrity estimate for Turah (98%) was the highest recorded during 14 years of monitoring in the Clark Fork River Basin. This site has the highest average biointegrity in the Clark Fork River (88%) and is among the healthiest stations in the study area. Biological integrity has been nonimpaired each year since 1992 except 1997 (Figure 24). Slight metals pollution was indicated at this site in 1986, 1990, and 1997 while nutrient and organic pollution was indicated in 1987, 1988, 1990 and 1992.

4.5.20   Blackfoot River near mouth (station 14)

The lower Blackfoot River continued to be among the healthiest stations in the study area and was nonimpaired in 1999. Biointegrity was estimated at 92%. Biointegrity has averaged 90% at this site over the past 14 years (Figure 25). Slight impairment was detected from 1986 through 1989 and was attributed to reduced sediment transport and higher temperatures during a drought. High flows during 1997 also resulted in a slightly lower biointegrity score (83%).

4.5.21   Clark Fork River above Missoula (station 15.5)

This site, located approximately 1.5 miles below Milltown Dam, was nonimpaired in 1999. Biointegrity (95%) was well above the long-term site average (82%). Slight to moderate nutrient/organic pollution was usually evident at this site (Figure 26). Metals pollution has not been indicated since 1990.

4.5.22   Clark Fork River at Shuffield's (station 18)

The Clark Fork at Shuffield's was nonimpaired (95%) in 1999. Biointegrity was well above the 14-year average (86%). Slight

nutrient/organic pollution was frequently indicated at this site (Figure 27) which is approximately two miles below the Missoula WWTP discharge. Metals pollution had not been clearly indicated at this site since monitoring began in 1986; however, both the 1997 and 1998 assessments were borderline (78%).

4.5.23   Bitterroot River near mouth (station 19)

Biointegrity was estimated at 93%, and considered nonimpaired, in the lower Bitterroot River during 1999. Biointegrity has averaged 86% since 1986. Nutrient/organic pollution has been indicated during nine of the past 14 years (Figure 28). Metals pollution has not been indicated at this site.

4.5.24   Clark Fork River at Harper Bridge (station 20)

The Clark Fork at Harper Bridge was classified as nonimpaired in 1999. Biological integrity was estimated at 92%. This site has the lowest long-term mean biointegrity (76%) among stations from Missoula to the Flathead River. Nutrient/organic pollution has been indicated at Harper Bridge on all dates prior to 1999 (Figure 29). Impacts have generally been slight, although moderate impacts were indicated in 1988 and 1993 (Figure 30). Impacts appear to result from the assimilation of nutrients from the Missoula WWTP and the Bitterroot River.

4.5.25   Clark Fork River at Huson (station 22)

Biointegrity was higher than average in 1999 (88%) but still indicated slight impairment at Huson. The long-term average for this site is 78%. Nutrient/organic pollution was not indicated in 1999 but was evident on all other dates (Figure 30). Biointegrity was moderately impaired in 1986, 1988, and 1994 and slightly impaired on all other dates.

The stream channel in this reach is unstable and collecting representative samples remains a problem. Samples have been collected from several locations in recent years (McGuire 1999).

Unstable substrates and variable sampling locations may have contributed to the relatively low density and the fluctuating metals tolerance index and EPT index values over the past four years (Appendix D-24). Sampling was conducted near the original site (below the island) in 1999.

4.5.26   Clark Fork River near Superior (station 24)

Biointegrity was nonimpaired (92%) in the Clark Fork River near Superior in 1999. Biointegrity has averaged 82% during the past 14 years with slight nutrient/organic pollution indicated most years (Figure 31).

4.5.27   Clark Fork River above the Flathead River (station 25)

The Clark Fork River above the confluence of the Flathead River was slightly impaired in 1999 when biointegrity was estimated at 88%. Since 1986, biointegrity has averaged 83% at this site. Slight nutrient/organic pollution was indicated during most years, including 1999 (Figure 32). There has been a significant change in benthic habitat at this site in recent years. High flows during 1997 apparently scoured away the dense undercoating of sponge (Porifera) that characterized cobbles in this reach. As of 1999, the sponge had not recovered to it's former abundance.

4.5.28   Clark Fork River above Thompson Falls Reservoir (station 27)

Biointegrity scores have averaged 71% at this site over the past 13 years. Biointegrity was 85% in 1999, the highest value recorded at this site since monitoring began in 1987 (Figure 33). The sampling technique and analyses used to evaluate the rest of the study area are only marginally suited to the river below the confluence of the Flathead River. The large river habitat, high discharge, and unique benthic community in this reach bias the biointegrity assessment. Nevertheless, the data can be used to monitor trends at this site.

Table 3. Annual peak flows and mean August streamflows at selected USGS gaging stations in the Clark Fork River Basin (cubic feet per second).

Peak discharge

Annual peak year	Silver Bow Creek blw Blacktail Cr. USGS # 12323250	Clark Fork River at Deer Lodge USGS # 12324200	Clark Fork River below Missoula USGS # 12353000	Clark Fork River near Plains USGS # 12389000
1986	253	**2090**	32300	76800
1987	270	463	15800	35800
1988	224	**409**	**14300**	**29200**
1989	**152**	1430	26300	58800
1990	320	507	22200	65900
1991	216	1020	27200	74100
1992	232	367	12400	30100
1993	165	613	23400	50500
1994	159	462	16900	31600
1995	320	1240	25500	73700
1996	272	1400	38200	90300
1997	276	2020	**55100**	**110000**
1998	**447**	1090		57200
1999	204	819	31300	63000
mean	251	995	26223	60500

Mean August discharge

August mean year	Silver Bow Creek blw Blacktail Cr. USGS # 12323250	Clark Fork River at Deer Lodge USGS # 12324200	Clark Fork River below Missoula USGS # 12353000	Clark Fork River near Plains USGS # 12389000
1986	19.5	55.7	1812	7612
1987	27.7	88.5	1473	9813
1988	18.7	**27.8**	997	**5656**
1989	22.0	81.7	2464	14750
1990	25.8	84.3	2554	10510
1991	16.4	30.1	1997	10350
1992	**14.2**	40.1	1280	9738
1993	**28.7**	312	**3696**	11770
1994	16.1	36.3	1295	5891
1995	21.8	107	2561	10360
1996	18.7	95.2	2766	16530
1997	27.5	**337**	3620	**17700**
1998	24.6	117	2890	13700
1999	22.4	93	2625	13400
mean	21.7	108	2288	11270

high and low flows in bold

Table 4. Mean metric values characterizing macroinvertebrate assemblages in eight Clark Fork River Basin stream reaches during August, 1986 through 1999 (ranges in parentheses).

metric	SBC 1986-1998 (range)	SBC 1999	CFR0 1986-1998 (range)	CFR0 1999	CFR1 1986-1998 (range)	CFR1 1999	CFR2 1986-1998 (range)	CFR2 1999	CFR3 1986-1998 (range)	CFR3 1999	CFR4 1986-1998 (range)	CFR4 1999	CFR5 1986-1998 (range)	CFR5 1999	CFR6 1986-1998 (range)	CFR6 1999	TRIBS 1993-1998 (range)	TRIBS 1999
Density	488 (88-1103)	743	1968 (896-2956)	1978	1822 (327-2717)	**3249**	1597 (392-4238)	1773	1802 (226-5635)	1111	1063 (492-2041)	841	1700 (198-3733)	336	1038 (393-2418)	554	734 (409-1120)	468
Taxa richness	10 (7-13)	13	29 (20-39)	**39**	27 (22-31)	**35**	32 (24-39)	**40**	39 (26-50)	42	36 (28-45)	39	32 (26-40)	35	33 (25-42)	36	36 (33-37)	**38**
EPT richness	2 (1-4)	3	12 (8-18)	17	14 (10-18)	15	17 (13-21)	**22**	21 (16-26)	25	20 (16-25)	22	17 (16-20)	**20**	18 (14-23)	21	19 (18-21)	21
S. Diversity	1.8 (1.5-2.1)	1.9	2.8 (2.1-3.3)	**3.8**	2.6 (1.9-3.9)	3.0	3.0 (2.7-3.8)	3.6	3.7 (3.1-4.4)	4.2	3.4 (2.9-4.0)	4.0	3.0 (2.2-3.7)	**4.1**	3.4 (2.6-3.8)	3.8	3.7 (3.3-3.8)	**4.1**
EPT/EPTC	0.18 (.04-.32)	0.20	0.86 (.69-.97)	0.70	0.86 (.68-.95)	0.79	0.83 (.74-.92)	0.80	0.75 (.61-.92)	0.66	0.81 (.62-.91)	0.81	0.77 (.52-.94)	0.76	0.74 (.60-.86)	0.76	0.68 (.51-.81)	0.60
Baetidae/ Ephemeroptera	0.96 (.67-1.00)	**1.00**	0.79 (.53-.98)	**0.19**	0.79 (.41-1.00)	0.60	0.70 (.24-.96)	0.46	0.53 (.22-.87)	**0.22**	0.64 (.37-.90)	**0.34**	0.65 (.45-.90)	**0.24**	0.44 (.19-.69)	0.28	0.53 (.40-.65)	0.43
Hydropsychinae/ Trichoptera	0.92 (.72-1.00)	0.83	0.89 (.65-.99)	0.70	0.88 (.57-1.00)	0.92	0.83 (.53-.96)	0.67	0.82 (.54-.96)	0.59	0.87 (.81-.95)	**0.47**	0.89 (.66-.98)	**0.45**	0.89 (.72-.97)	0.78	0.52 (.31-.72)	0.44
% Filterer	34 (7-55)	36	55 (29-72)	30	65 (35-81)	62	56 (26-72)	43	48 (22-68)	25	60 (36-75)	38	63 (48-74)	**33**	63 (52-86)	57	43 (31-53)	32
Biotic index	5.5 (5.1-6.1)	5.9	5.0 (4.7-5.3)	5.0	5.0 (4.8-5.4)	5.3	4.9 (4.5-5.6)	4.8	4.5 (3.8-5.1)	4.2	4.5 (4.2-5.2)	4.5	4.7 (3.6-5.3)	4.5	4.7 (4.2-5.0)	4.4	3.9 (3.7-4.1)	4.1
Metals index	8.2 (7.6-8.9)	**7.6**	5.1 (4.6-5.8)	4.7	5.1 (4.7-5.6)	5.3	4.9 (4.6-5.3)	**4.4**	4.6 (3.5-5.3)	3.9	4.6 (4.0-5.7)	4.1	4.7 (3.8-5.3)	**3.3**	4.1 (3.5-4.7)	3.6	3.8 (3.4-4.1)	3.9

Stream reaches: SBC = stations 00, 01, 02.5; CFR0 = 04.5, 07, 08, 08.5; CFR1 = 09, 10; CFR2 = 11, 11.7, 12; CFR3 = 13; CFR4 = 15.5, 18; CFR5 = 24, 25; CFR6 = 20, 22; TRIBS = 06, 10.2, 11.5, 12.5, 14, 19.
1999 values in bold were outside established ranges.

Table 5. Macroinvertebrate community biointegrity estimates for Clark Fork River Basin stations during August, 1999.

Station	% Biointegrity		
	overall	metals subset	organic subset
SF-1	80 *	72 *	94
Silver Bow Creek			
00	41 ***	44 **	78 *
01	33 ***	50 **	67 *
02.5	50 ***	22 ***	100
Clark Fork River			
04.5	83 *	78 *	78 *
07	94	89	89
08	91	89	89
08.5	89	83	83
09	75 *	78 *	67 *
10	77 *	78 *	61 *
11	88 *	83	83
11.7	94	94	83
12	97	94	94
13	98	100	94
15.5	95	89	100
18	95	94	89
20	92	83	92
22	88 *	78 *	92
24	92	94	83
25	88 *	83	75 *
27	85 *	72 *	83
Tributaries			
05	97	94	100
06	95	94	94
10.2	95	100	94
11.5	83 *	67 *	83
12.5	90	83	92
14	92	78	100
19	93	83	100
Reach means			
SBC	41 ***	39 ***	82
CFR0	89 *	85	85
CFR1	76 *	78 *	64 *
CFR2	93	90	87
CFR3	98	100	94
CFR4	95	92	95
CFR5	90	81	92
CFR6	90	89	79
Tributaries	92	86	95
ALL	85 *	80 *	87

Classification : slightly impaired *, moderately impaired **, severely impaired ***.

Table 6. Mean macroinvertebrate biointegrity (%) and Spearman rank correlation coefficients (rs) for Clark Fork River Basin monitoring stations - August, 1986-1999.

station	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean	S.D.	C.V.(%)	rs	P value
SF-1								64	74	68	65	61	74	80	69	7	10	.31	.10
Silver Bow Creek																			
00		18	32	15	22	35	17	22	35	27	30	47	33	41	29	10	34	**.71**	**.000**
01	38	17	32	13	26	25	20	20	21	25	27	18	23	33	24	7	28	.17	.21
02.5	38	40	35	50	43	43	43	47	55	43	50	38	45	50	44	6	13	.30	**.027**
Clark Fork River																			
04.5	45	44	44	47	41	45		71	70	59	62	58	61	83	56	13	23	**.73**	**.000**
07	59	64	53	59	55	65	65	83	82	88	77	94	86	94	73	15	20	**.84**	**.000**
08	71	65	71	65	85	73	88						83	91	77	10	13	**.71**	**.000**
08.5					88	88	89						91	89	89	1	1	.43	.06
09	52	65	62	73	61	83	55	86	53	58	55	55	60	75	64	11	18	-.15	.27
10	52	68	71	80	79	86	68	87	59	74	65	48	59	77	70	12	17	-.07	.59
11	86	80	85	88	63	89	85	92	94	86	78	62	86	88	83	10	12	-.03	.83
11.7								94	67	73	70	55	85	94	77	15	19	.11	.58
12	64	80	58	76	61	64	56	89	76	74	70	57	76	97	71	12	17	.23	.09
13	88	80	76	88	86	92	83	95	89	94	94	82	91	98	88	6	7	.45	**.001**
15.5	76	88	86	77	68	79	80	90	82	83	85	71	82	95	82	7	9	.21	.14
18	73	88	91	80	86	91	83	95	80	94	86	78	79	95	86	7	8	.13	.33
20	71	77	61	79	73	79	76	61	79	82	76	83	76	92	76	8	11	.41	**.002**
22	62	86	68	89	88	71	74	85	68	79	75	78	82	88	78	9	11	.19	.15
24	90	79	76	73	88	85	92	91	74	89	73	71	79	92	82	8	10	-.13	.35
25	83	85	82	76	80	83	88	80	82	98	77	73	88	88	83	6	8	.17	.21
27		65	68	64	67	72	67	67	78	72		75	73	85	71	6	9	**.52**	**.000**
Tributaries																			
05	58	61	67	61		43				75	90	90	92	97	65	18	28	**.70**	**.000**
06	67	78	80	82	78	91		77	91	97	92	88	88	95	84	8	10	-.17	.40
10.2								90	94	92	85	90	91	95	92	4	4	.23	.23
11.5								77	83	78	73	90	91	83	86	5	6	-.15	.44
12.5								91	93	94	95	90	98	90	93	3	3		
14	82	83	90	85	92	88	89	90	95	97	86	83	95	92	90	5	5	**.57**	**.000**
19	79	83	82	91	85	86	79	90	73	98	85	87	92	93	86	7	8	.39	**.003**
Reach means																			
SBC	58	25	33	26	30	34	27	30	37	32	36	34	34	41	32	5	14	.23	.18
CFR0	58	58	56	57	67	68	81	77	76	74	70	76	80	89	70		10	.48	**.003**
CFR1	52	67	67	77	70	85	62	87	56	66	60	52	60	76	67	11	17	-.20	.33
CFR2	75	80	72	82	62	77	71	92	79	78	73	58	82	93	77	10	13	-.10	.60
CFR3	88	80	76	88	86	92	83	95	89	94	94	82	91	98	88	6	7		
CFR4	75	88	89	79	77	85	82	93	81	89	86	75	81	95	84	6	8	.12	.47
CFR5	67	82	65	84	81	75	75	73	74	81	76	81	79	90	77	7	9	.18	.37
CFR6	87	82	79	75	84	84	90	86	78	94	75	72	84	90	83	6	8	-.18	.39
TRIBs								86	88	92	86	88	93	91	90	3	3	.14	.43
All stations	67	68	67	69	69	72	70	77	74	77	73	69	77	85	72	5	7	**.73**	**.005**

* Stream reaches: SBC = stations 00, 01 & 02.5; CF0 = stations 04.5, 07, 08, 08.5; CF1 = stations 09 &10; CF2 = stations 11,11.7, &12; CF3 = station 13;
CF4 = stations 15.5 & 18; CF5 = stations 20 & 22; CF6 = stations 24 & 25; Tribs = stations 06, 10.2, 11.5, 12.5, 14 &19.

34

Table 7. Macroinvertebrate biointegrity (%) as measured by metrics' sensitive to metals pollution and Spearman rank correlation coefficients (r_s) for Clark Fork River Basin stations - August, 1986-1999.

station	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean	S.D.	C.V.(%)	r_s	P value
SF-1								67	67	72	67	61	72	72	68	4	6	.38	.05
Silver Bow Creek																			
00		0	0	11	22	17	11	11	39	17	33	39	28	44	21	15	70	**.80**	**.000**
01	39	6	44	33	44	33	28	44	44	28	39	17	44	50	35	12	35	.15	.29
02.5	22	17	44	28	22	28	50	33	56	22	44	22	28	22	31	12	39	-.01	.95
Clark Fork River																			
04.5	61	61	61	67	67	61		72	72	61	72	72	72	78	67	6	9	**.73**	**.000**
07	72	72	78	72	72	72		83	83	78	83	89	94	89	79	8	10	**.82**	**.000**
08	78	72	72	72	72	67	83	83		83	83		83	89	76	7	9	**.58**	**.000**
08.5					83	83	83						83	89	83	0	0	**.58**	**.008**
09	78	78	72	83	72	83	72	78	72	72	78	67	83	83	76	5	6	-.05	.74
10	72	78	72	67	78	83	78	78	78	78	83	44	78	78	75	10	13	.19	.16
11	83	78	78	89	67	83	78	89	94	83	83	67	89	83	82	8	10	.22	.10
11.7								89	89	83	83	72	89	94	86	7	8	.12	.54
12	78	83	78	78	72	78	78	83	83	83	83	61	89	94	80	8	10	.24	.07
13	78	89	94	83	78	89	94	94	89	83	83	61	89	94	88	10	11	.31	**.020**
15.5	83	92	92	72	78	83	83	83	89	89	94	83	94	89	86	7	8	.36	**.011**
18	83	89	89	83	89	89	94	94	89	94	94	78	78	94	88	6	7	.01	.94
20	83	83	78	78	78	83	83	89	89	89	89	78	94	83	84	5	6	-.24	.08
22	83	89	83	89	78	83	83	83	83	83	78	83	83	78	83	3	4	-.47	**.000**
24	89	83	89	83	94	83	94	94	83	94	83	83	94	94	89	5	6	-.09	.49
25	67	89	94	83	89	83	89	94	94	100	94	89	89	83	88	8	9	.32	.150
27		72	78	72	78	78	78	67	78	67		50	56	72	71	9	13	-.40	**.005**
Tributaries																			
05	61	72	67	72		50		72		67	83	78	89	94	69	15	21	.75	**.000**
06	50	56	67	72	67	83		89	83	94	89	78	78	94	74	13	17	-.19	.33
10.2								72	83	67	83	78	89	100	89	8	9	-.06	.76
11.5								89	94	94	94	89	89	67	87	9	10	-.32	.10
12.5								89	89	83	89	78	94	83	87	6	7		
14	61	83	83	67	83	72	100	83	94	94	83	78	94	83	82	11	13	.35	**.009**
19	83	89	89	94	83	89	89	78	83	100	89	83	94	83	88	6	7	-.03	.82
Reach means																			
SBC		8	29	24	29	26	30	29	46	22	39	26	33	39	29	9	33	.28	.10
CFR0	75	68	70	70	74	71	79	78	78	70	78	81	83	85	74	5	7	.47	**.004**
CFR1	81	78	72	75	75	83	75	78	75	75	81	56	78	78	75	6	8	-.01	.95
CFR2	78	81	78	84	70	81	78	87	89	83	83	67	89	90	81	7	8	.23	.21
CFR3	83	89	94	83	78	89	94	94	89	89	94	61	89	90	87	7	9	.23	.21
CFR4	83	91	91	78	84	86	89	94	92	92	94	81	94	100	87	10	11	.22	.17
CFR5	83	86	81	84	78	83	83	89	83	92	94	81	86	92	87	5	6	.22	.17
CFR6	78	86	92	83	92	83	92	86	83	86	84	81	89	81	83	3	3	.14	.49
TRIBs		86	92	83	92	83	92	94	89	97	89	86	92	89	88	5	6	.31	.13
All stations	70	70	73	70	71	72	76	77	80	76	79	68	80	80	74	3	4	.01	.97
																		.56	**.045**

* metric subset: metals tolerance index, EPT richness and community density.

Table 8. Macroinvertebrate biointegrity (%) as measured by metrics* sensitive to organic pollution and Spearman rank correlation coefficients (rs) for Clark Fork River Basin stations - August, 1986-1999.

station	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean	S.D.	C.V. (%)	rs	P value
SF-1								56	94	78	78	72	89	94	80	14	17	.17	.40
Silver Bow Creek																			
00		83	83	58	75	83	67	83	83	75	75	92	75	78	78	9	11	.15	.28
01	67	67	67	17	50	58	42	28	33	67	61	58	39	67	52	17	33	.06	.64
02.5	83	83	33	100	83	75	42	92	61	92	75	92	92	100	79	20	26	.28	.036
Clark Fork River																			
04.5	50	56	44	39	39	56		83	72	56	50	33	33	78	53	16	31	.16	.27
07	72	72	50	78	56	72	83	83	83	83	67	89	67	89	75	12	16	.45	.001
08	78	78	78	67	89	83	89						72	89	80	8	10	.35	.05
08.5						89	83						89	83	87	3	4	-.36	.12
09	56	67	50	61	44	83	50	89	50	50	39	50	67	67	59	14	25	-.33	.014
10	39	61	56	83	67	89	67	83	50	67	50	58	56	61	63	14	22	-.08	.57
11	89	72	92	89	42	89	78	94	89	83	67	42	78	83	78	17	22	-.30	.035
11.7								89	50	61	67	42	83	83	68	18	27	-.18	.35
12	72	83	33	67	61	50	44	89	72	67	72	58	72	94	67	17	25	.11	.41
13	89	67	44	89	83	83	67	92	89	89	83	92	89	94	82	14	17	.37	.005
15.5	72	75	81	58	42	78	83	100	78	67	72	61	67	100	74	15	21	.13	.38
18	67	89	94	78	72	89	61	89	61	89	67	50	78	89	77	14	18	-.14	.32
20	67	67	39	78	67	72	61	33	67	67	61	67	61	92	64	14	22	.12	.39
22	61	78	50	89	92	61	61	78	33	67	67	100	75	92	72	18	26	.34	.011
24	83	72	61	61	78	83	89	89	61	78	61	61	61	83	73	12	16	-.21	.12
25	92	83	72	72	72	83	83	61	72	94	56	56	78	75	75	12	16	-.17	.21
27		42	56	56	33	50	61	42	67	50	61	67	50	58	53	10	20	.54	.000
Tributaries																			
05	58	61	78	56		42	50								66	20	31	.17	.24
06	100	92	75	94	83	94	85	92	94	92	89	100	100	94	92	7	7	-.13	.49
10.2								92	94	94	89	92	92	94	92	2	2	.06	.75
11.5								67	72	89	67	78	89	83	78	10	12	.06	.75
12.5								100	100	100	100	100	100	92	99	3	3	-.65	.000
14	100	83	83	100	100	100	94	92	92	100	92	67	92	100	93	9	10	.01	.96
19	72	72	72	83	72	78	67	92	56	94	72	67	83	100	77	12	16	.26	.06
Reach means																			
SBC		78		58	69	72	50	68	59	78	70	81	69	82	69	10	14	.10	.57
CFR0	67	69	61	61	68	75	85	83	78	70	59	61	65	85	70	10	14	.11	.53
CFR1	48	64	53	72	56	86	59	86	50	59	45	54	62	64	61	13	21	-.08	.70
CFR2	81	78	63	78	52	70	61	91	70	70	69	47	78	87	71	12	17	-.19	.30
CFR3	89	67	44	89	83	83	67	92	89	89	83	92	89	94	82	14	17	.02	.88
CFR4	70	82	88	68	57	84	72	95	70	78	70	56	73	95	75	12	16		
CFR5	64	73	45	84	80	67	61	56	50	67	64	84	68	92	68	13	20	.02	.94
CFR6	88	78	67	67	75	83	86	75	67	86	59	59	70	79	74	10	13	-.36	.07
TRIBS								89	85	95	85	84	93	94	89	5	5	-.02	.90
All stations	73	73	63	72	68	76	69	80	71	78	70	70	75	86	73	6	8	.15	.62

* metric subset: biotic index, % filterers and community density.

36

Figure 2. Aquatic macroinvertebrate community biointegrity at 27 stations in the Clark Fork River Basin during August, 1999.

37
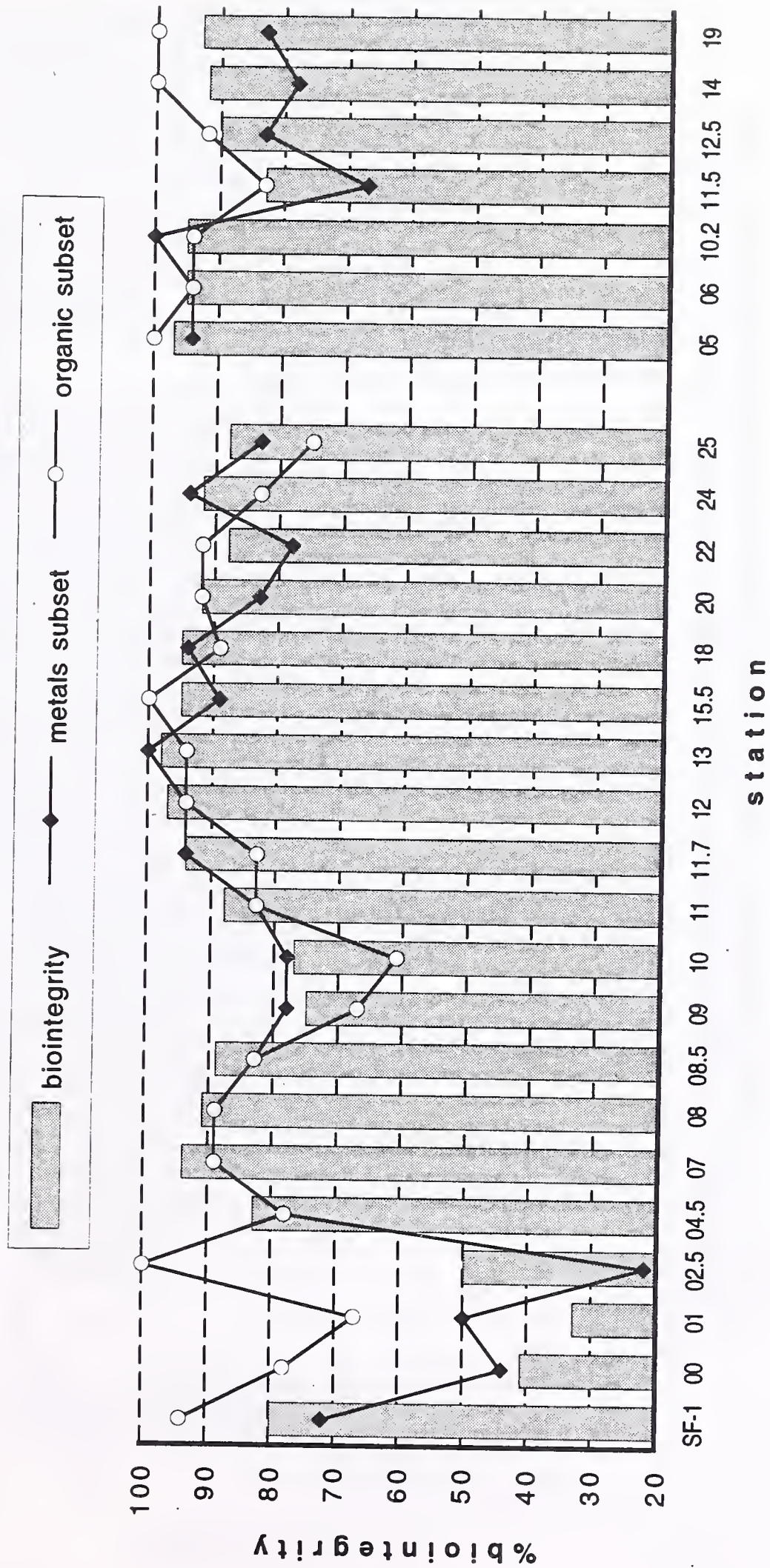
Figure 3. Long-term aquatic macroinvertebrate community biointegrity at 28 stations in the Clark Fork River Basin during August (1986-1998 and 1999).
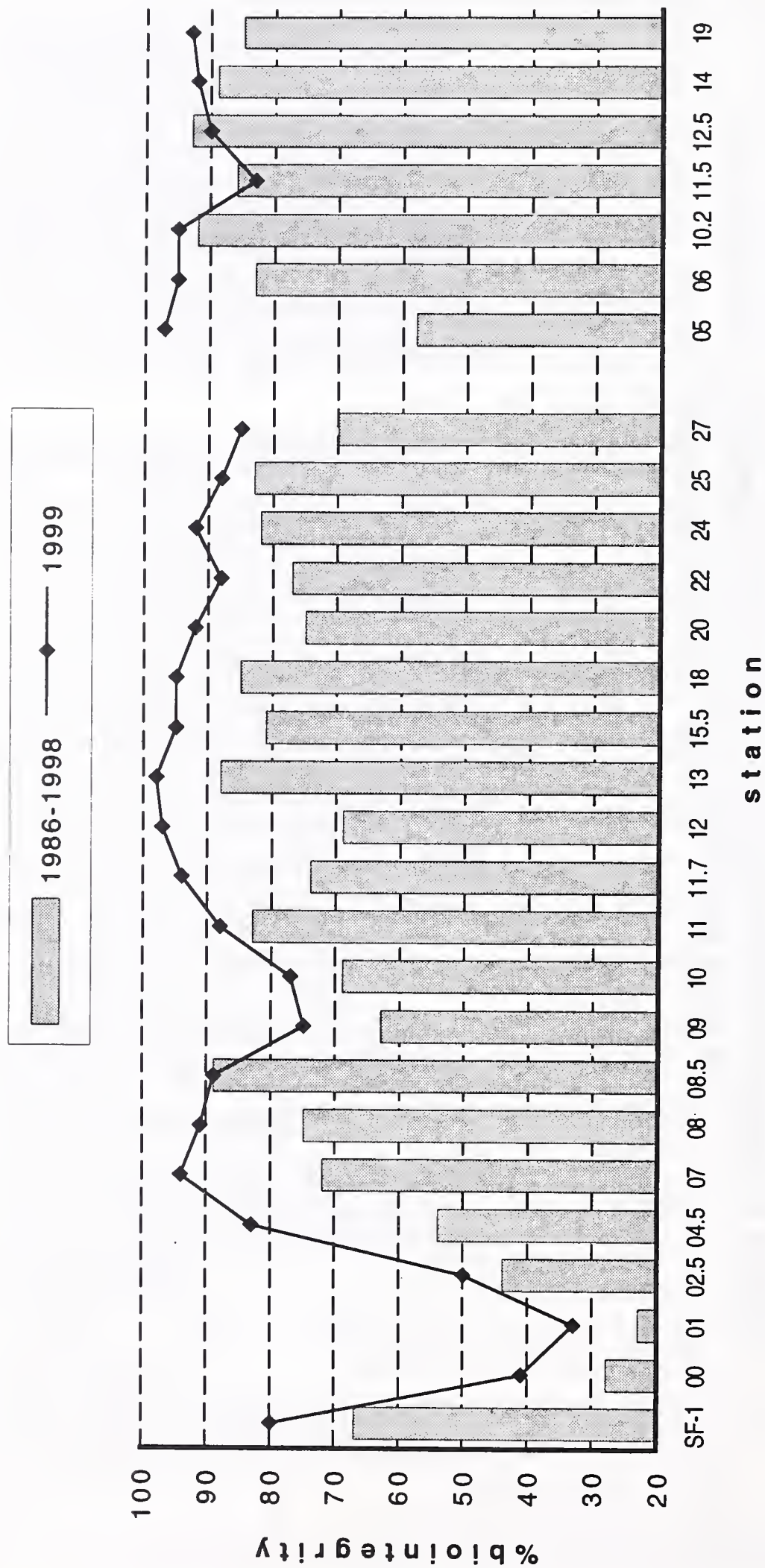
Figure 4. Mean aquatic macroinvertebrate community biointegrity in Clark Fork River Basin stream reaches and tributaries during August, 1999.

39
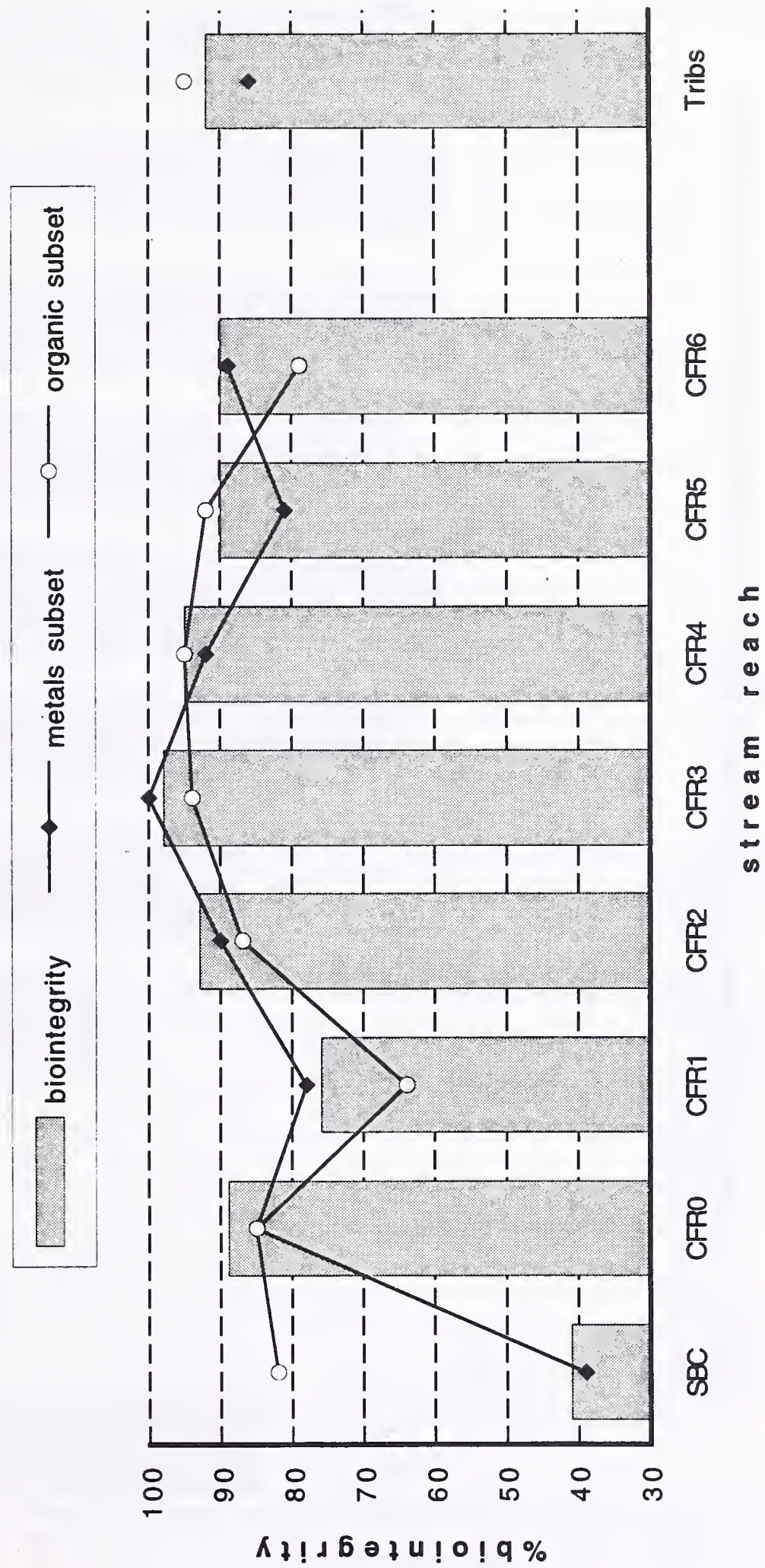
Figure 5. Mean aquatic macroinvertebrate community biointegrity in selected Clark Fork River tributaries, 1993-1999.

40
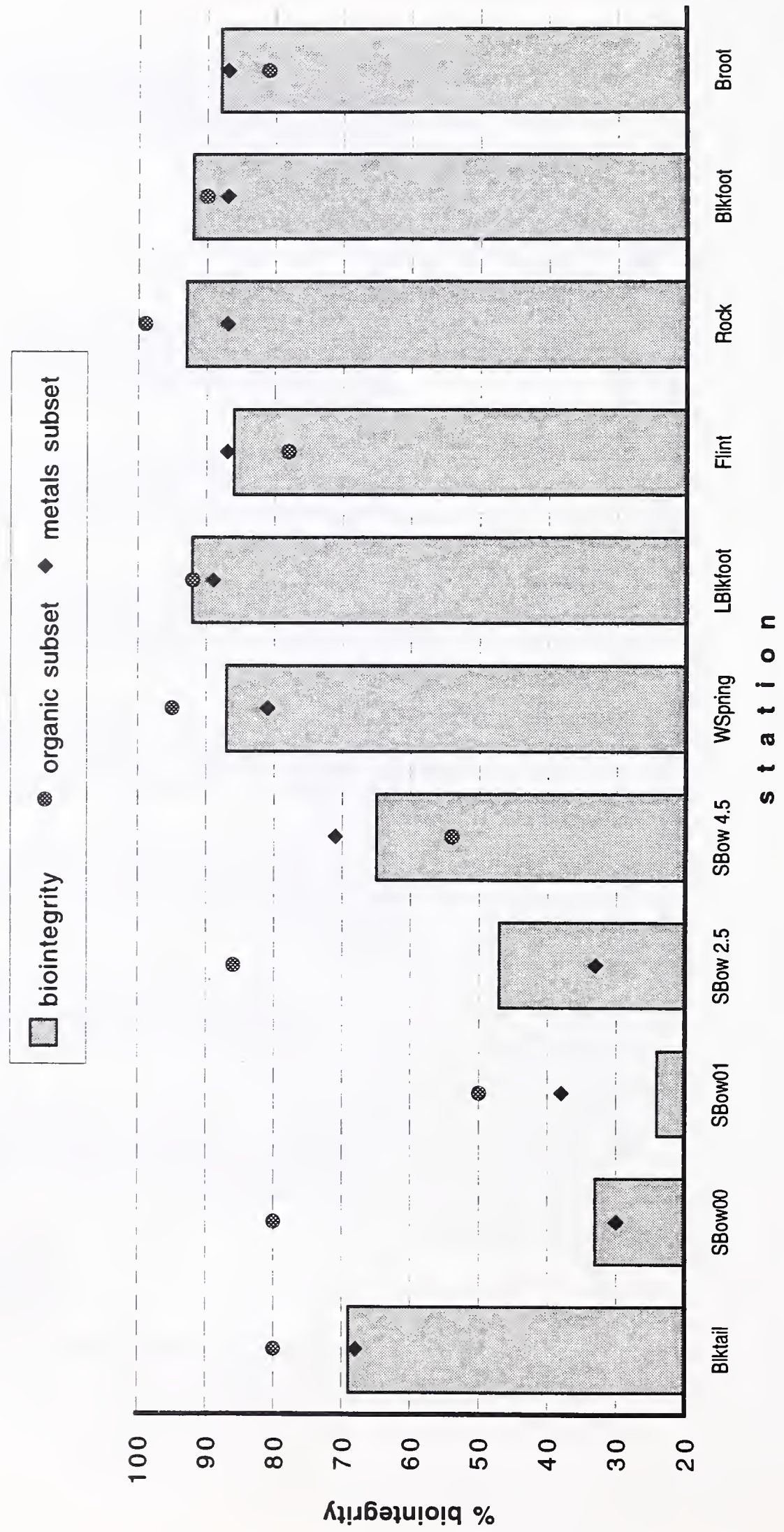
Figure 6. Biointegrity (%) in Blacktail Creek above Grove Gulch (station SF-1), 1993-1999.
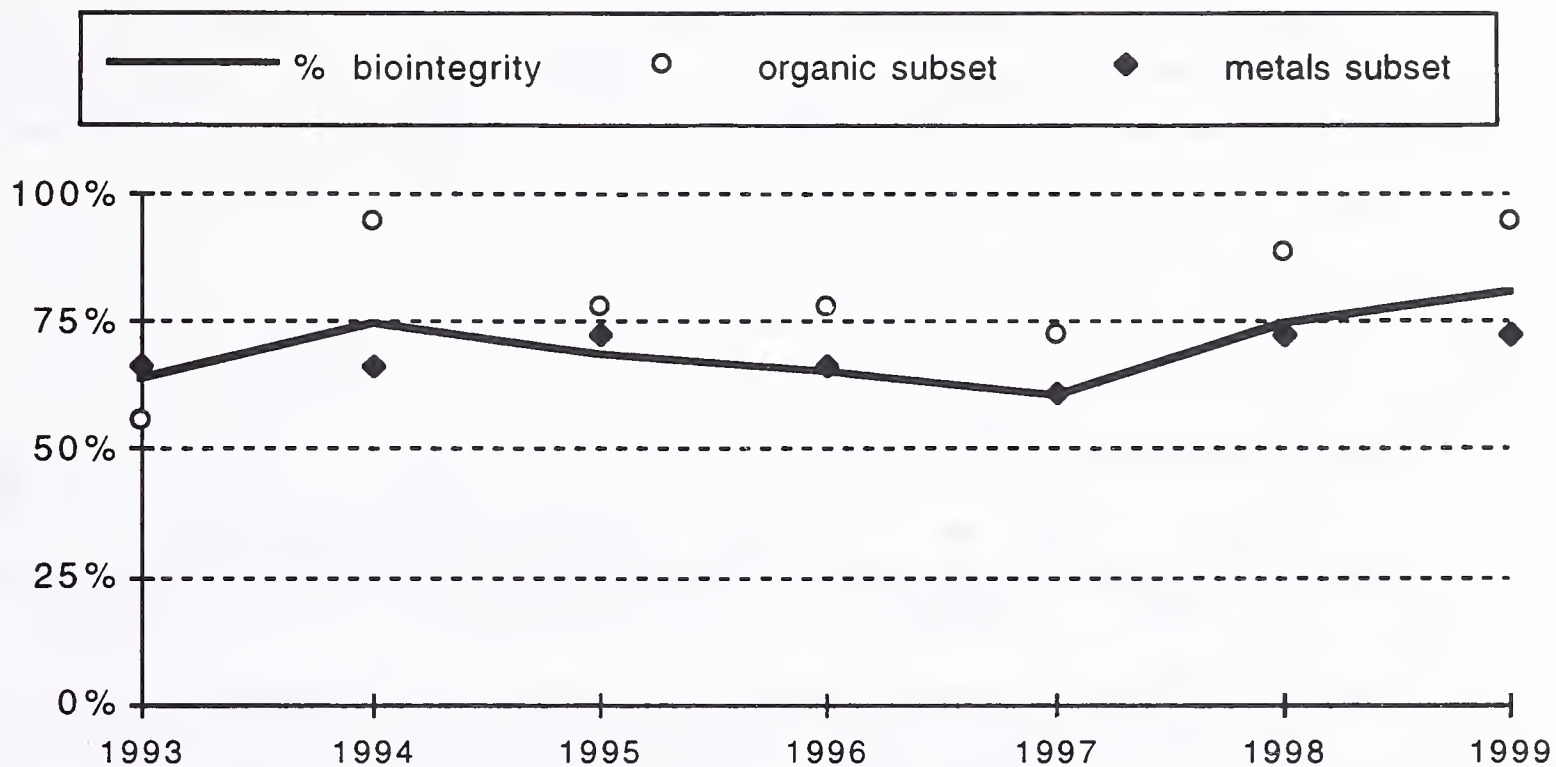
Figure 7. Biointegrity (%) in Silver Bow Creek above the Butte WWTP (station 00), 1987-1999.
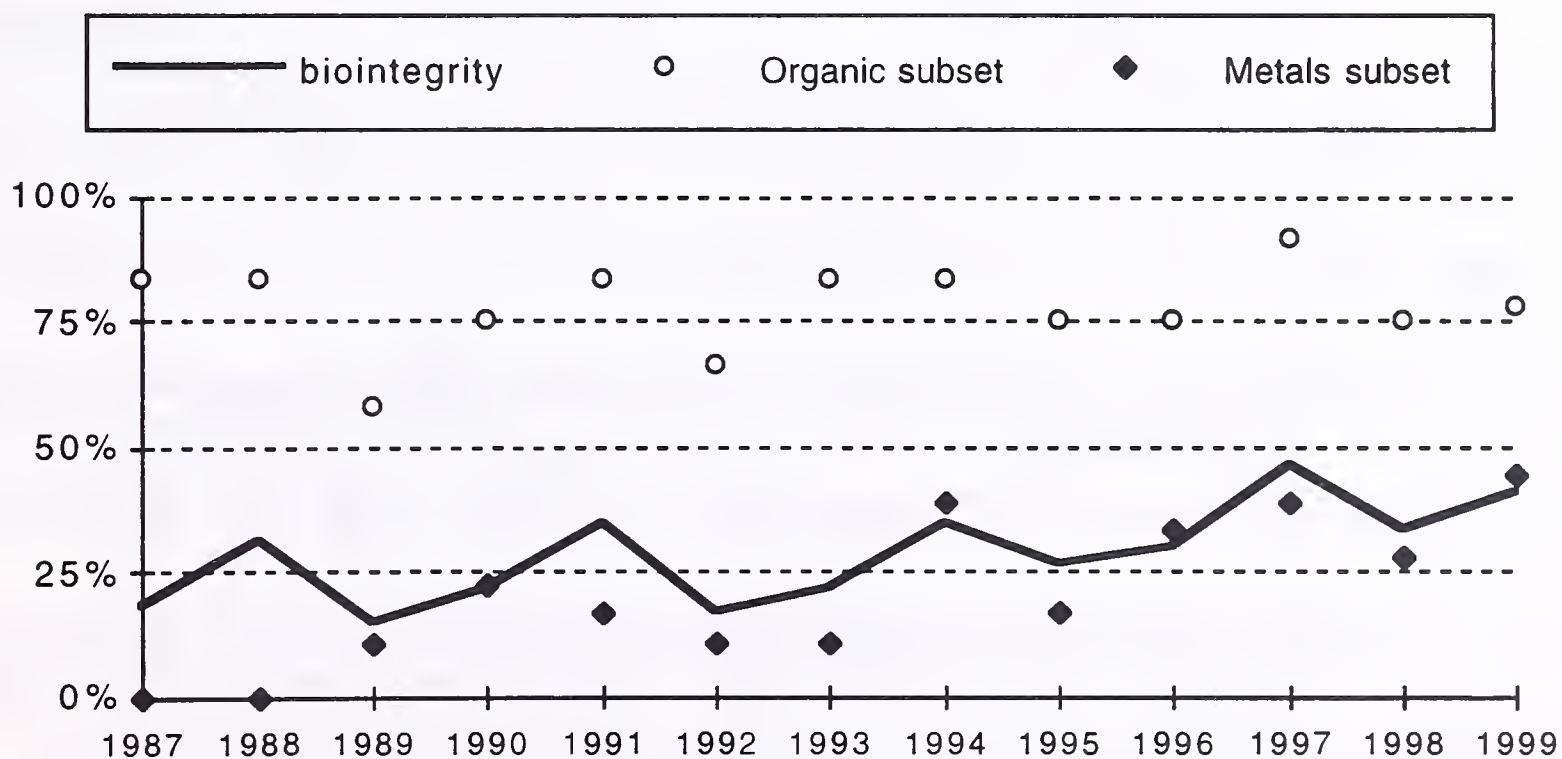
Figure 8. Biointegrity (%) in Silver Bow Creek below the Colorado Tailings (station 01), 1986-1999.
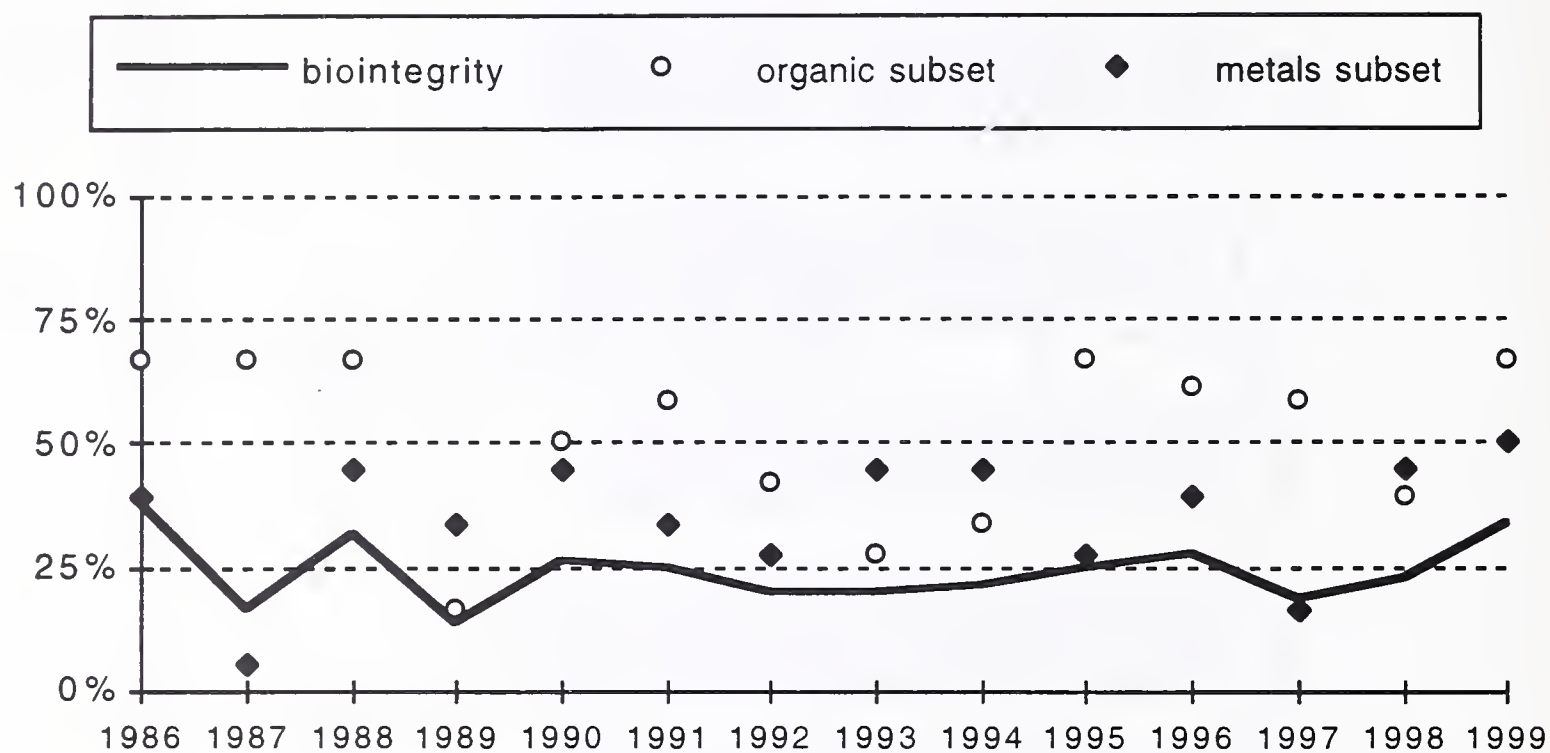
Figure 9. Biointegrity (%) in Silver Bow Creek near Opportunity (station 02.5), 1986-1999.
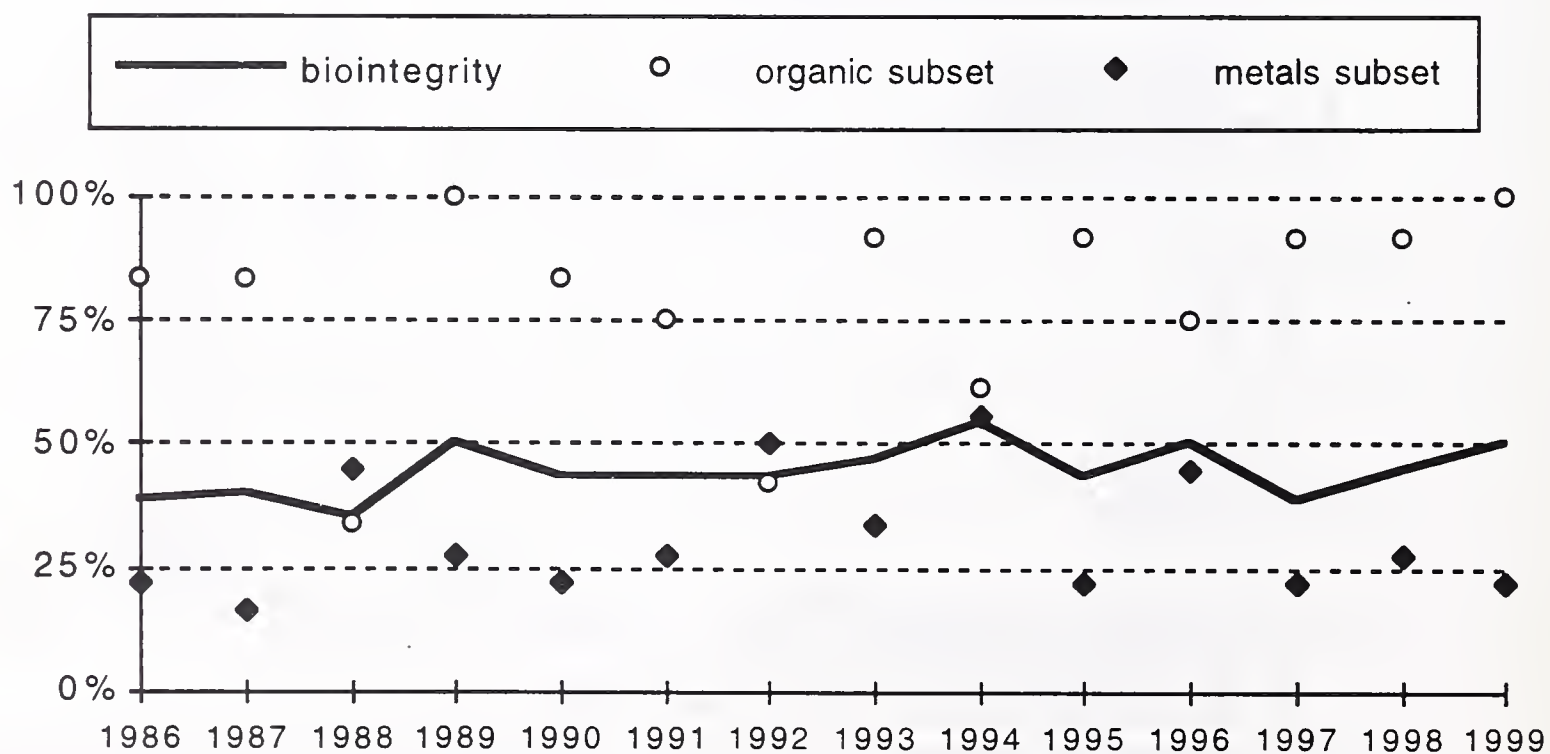
Figure 10. Biointegrity (%) in Silver Bow Creek below the Warm Springs Ponds (station 04, 1986-1991; station 04.5, 1993-1999).
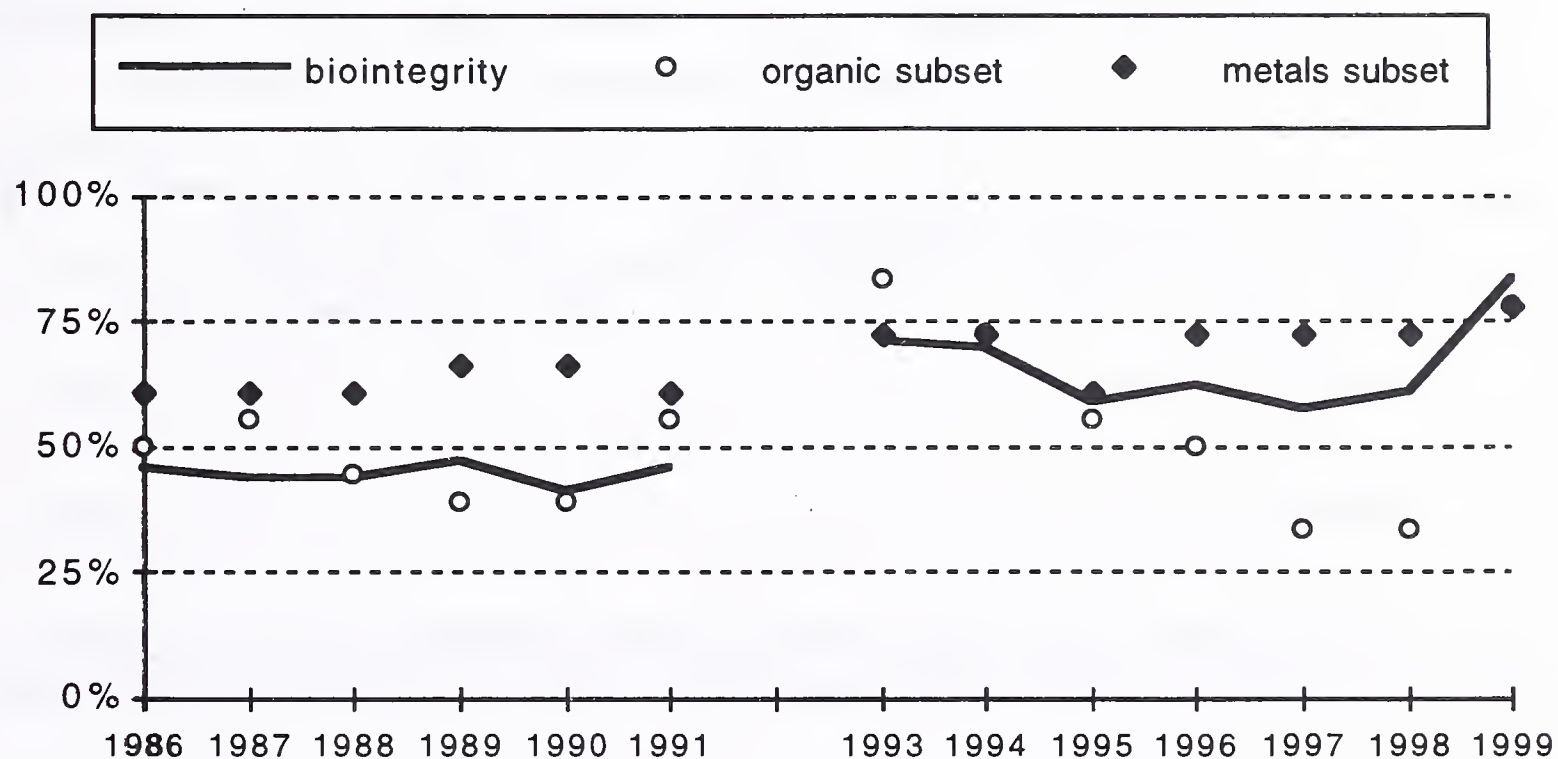
Figure 11. Biointegrity (%) in the Mill-Willow Bypass (station 05, 1986-1991 and 1999).
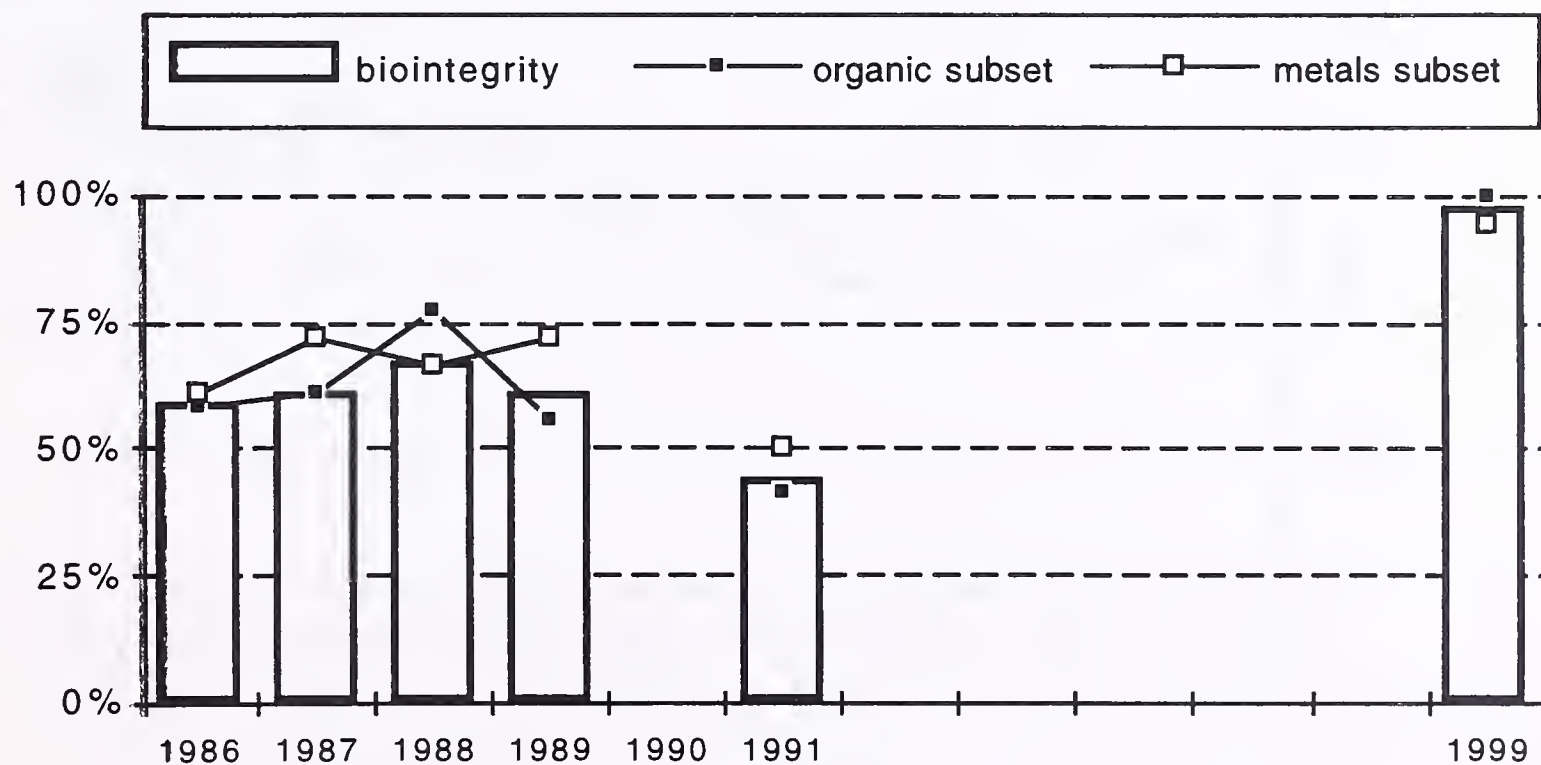
Figure 12. Biointegrity (%) in Warm Springs Creek near mouth (station 06, 1986-1999).
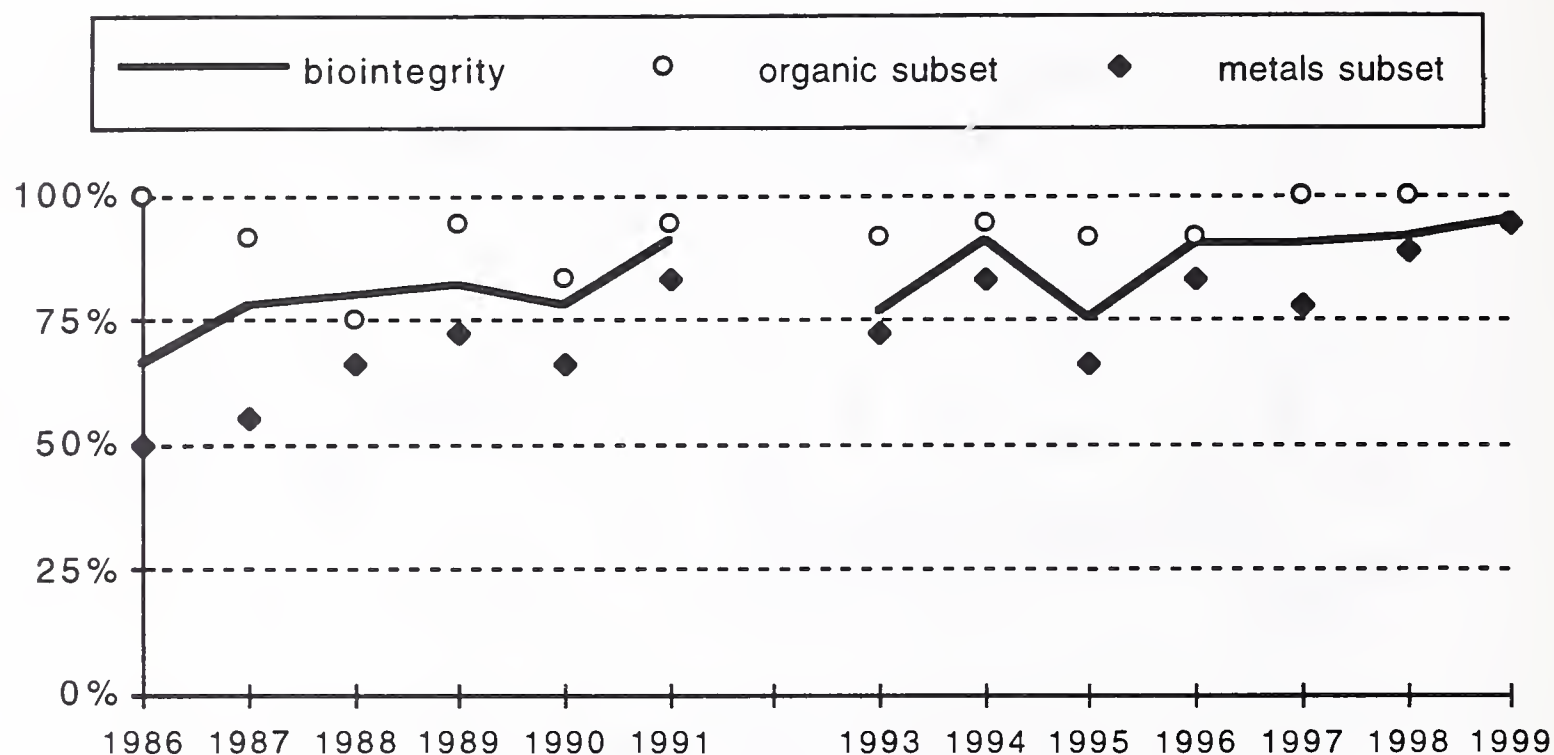
Figure 13. Biointegrity (%) in the Clark Fork River below Warm Springs Creek (station 07), 1986-1999.
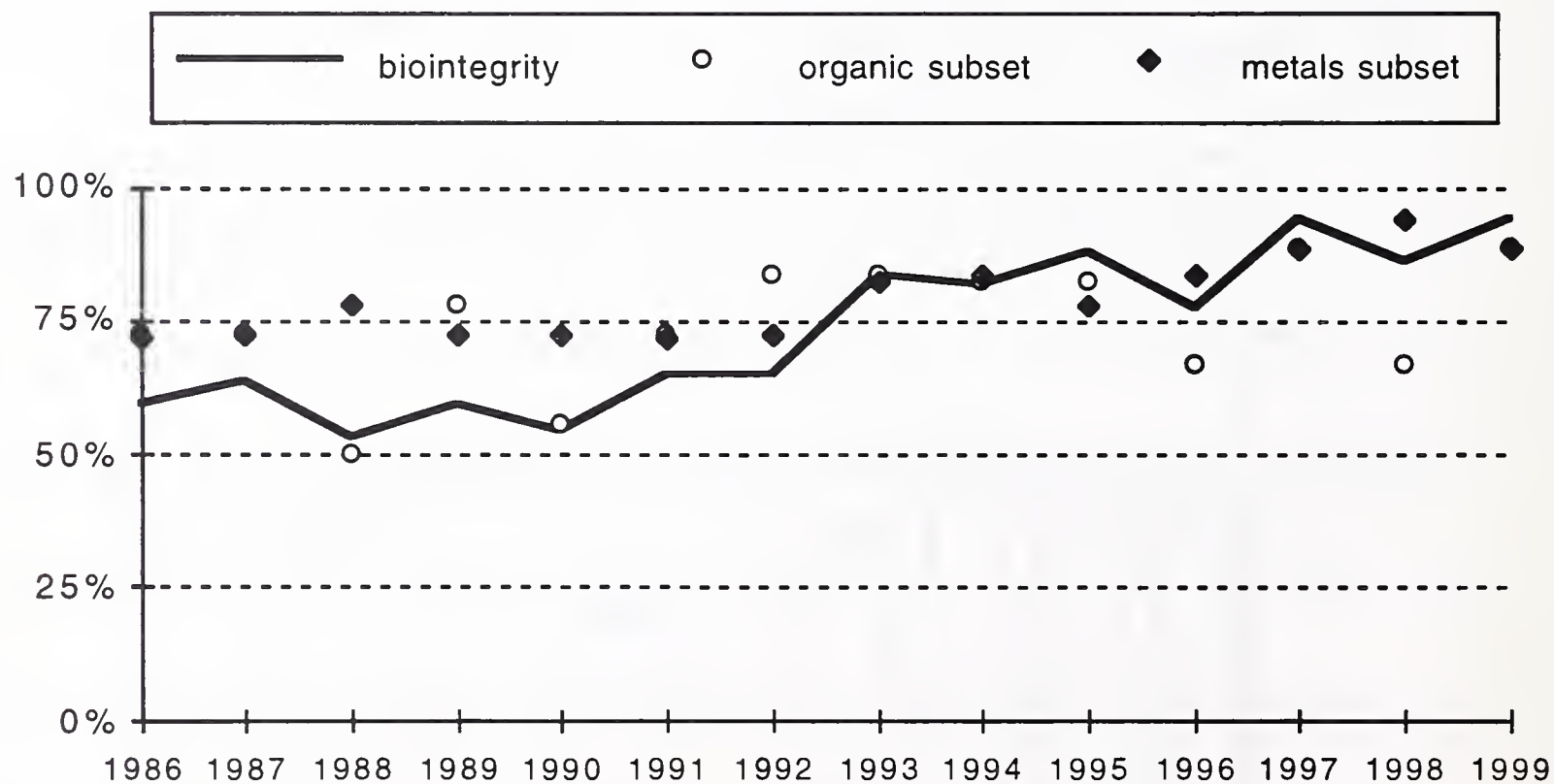
Figure 14. Biointegrity (%) in the Clark Fork River near Dempsey (station 08), 1986-1992, 1998-1999.
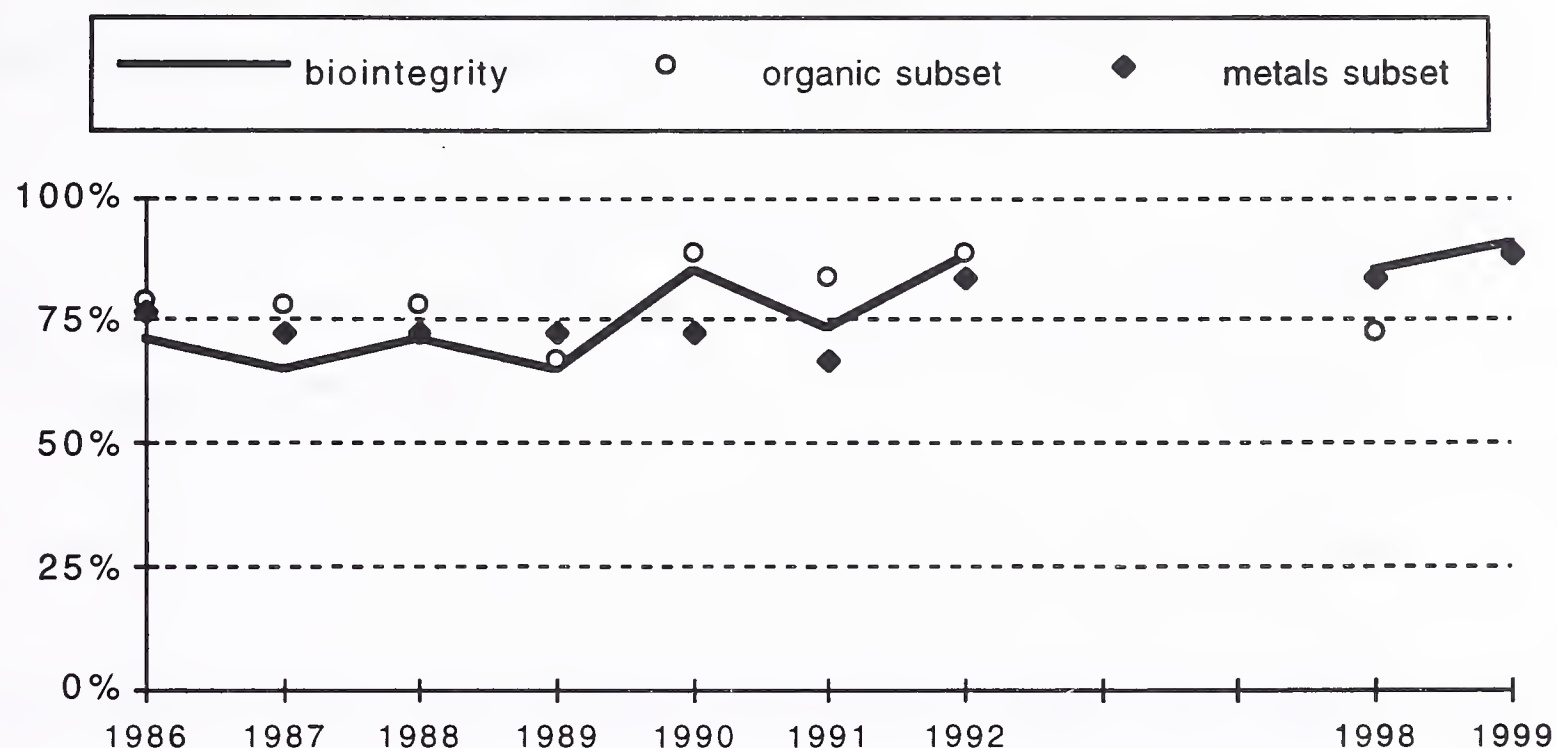
Figure 15. Biointegrity (%) in the Clark Fork River at Sager Lane (station 08.5), 1990-1992, 1998-1999.
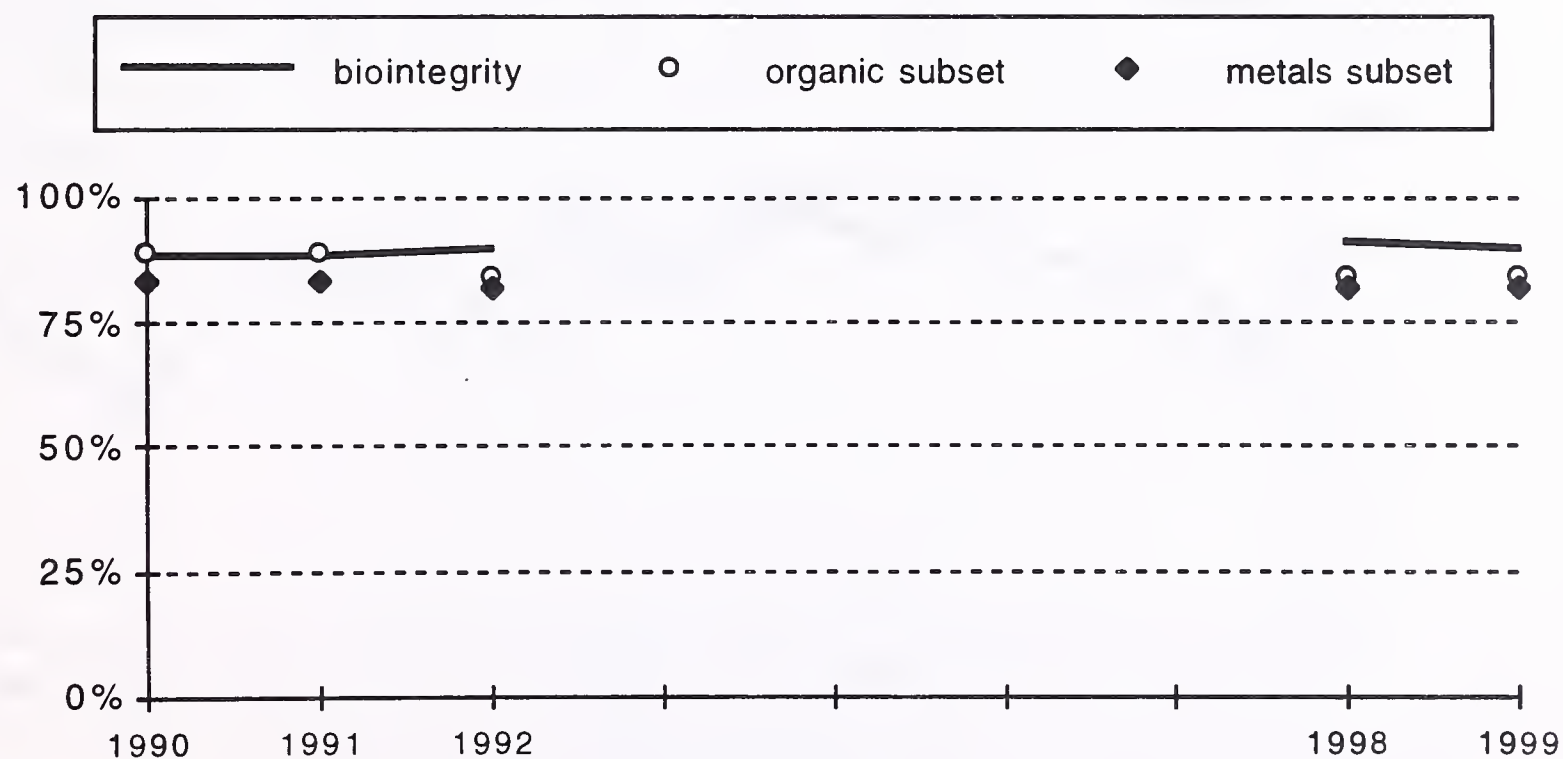
Figure 16. Biointegrity (%) in the Clark Fork River at Deer Lodge (station 09), 1986-1999.
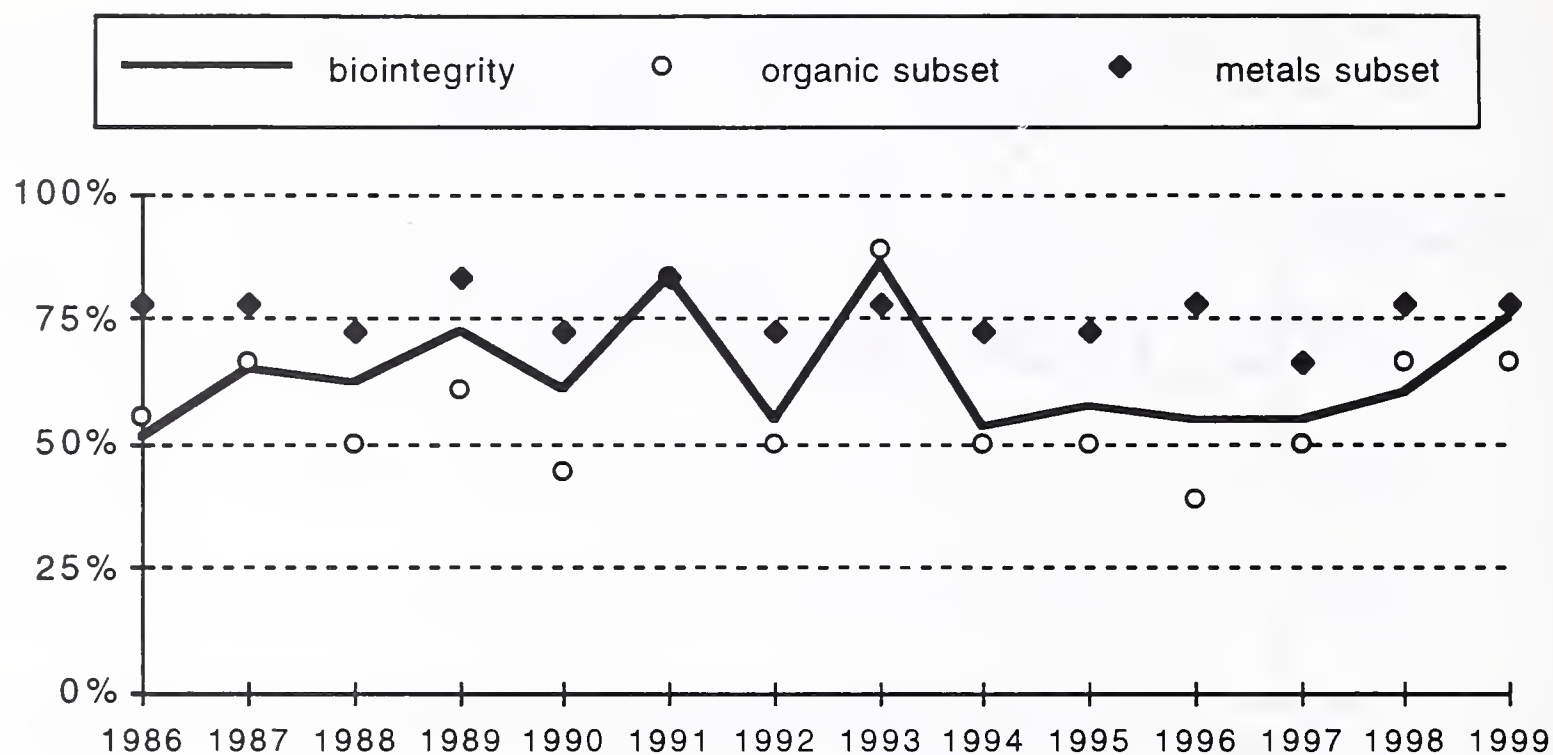
Figure 17. Biointegrity (%) in the Clark Fork River above the Little Blackfoot River (station 10), 1986-1999.
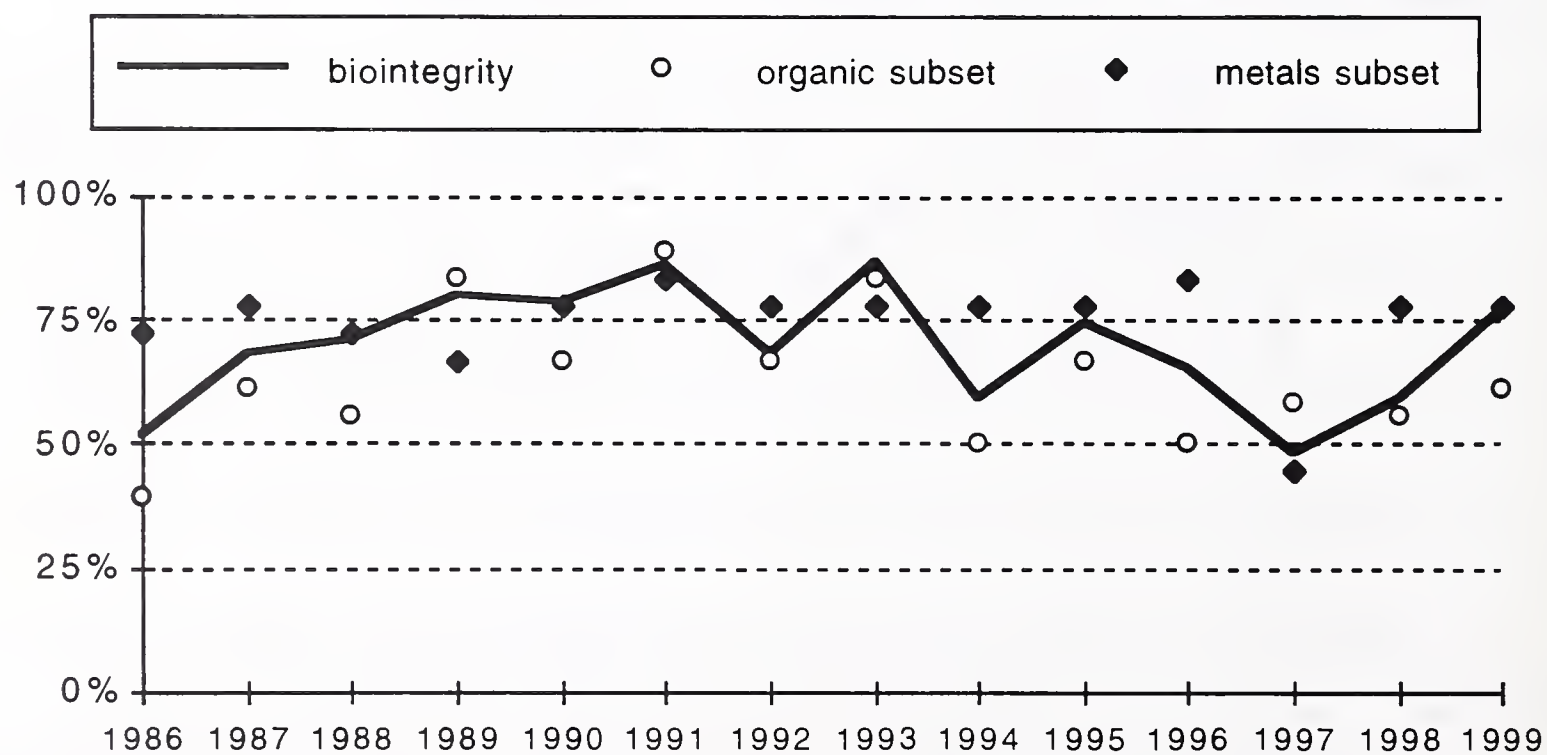
Figure 18. Biointegrity (%) in the Little Blackfoot River near mouth (station 10.2), 1993-1999.
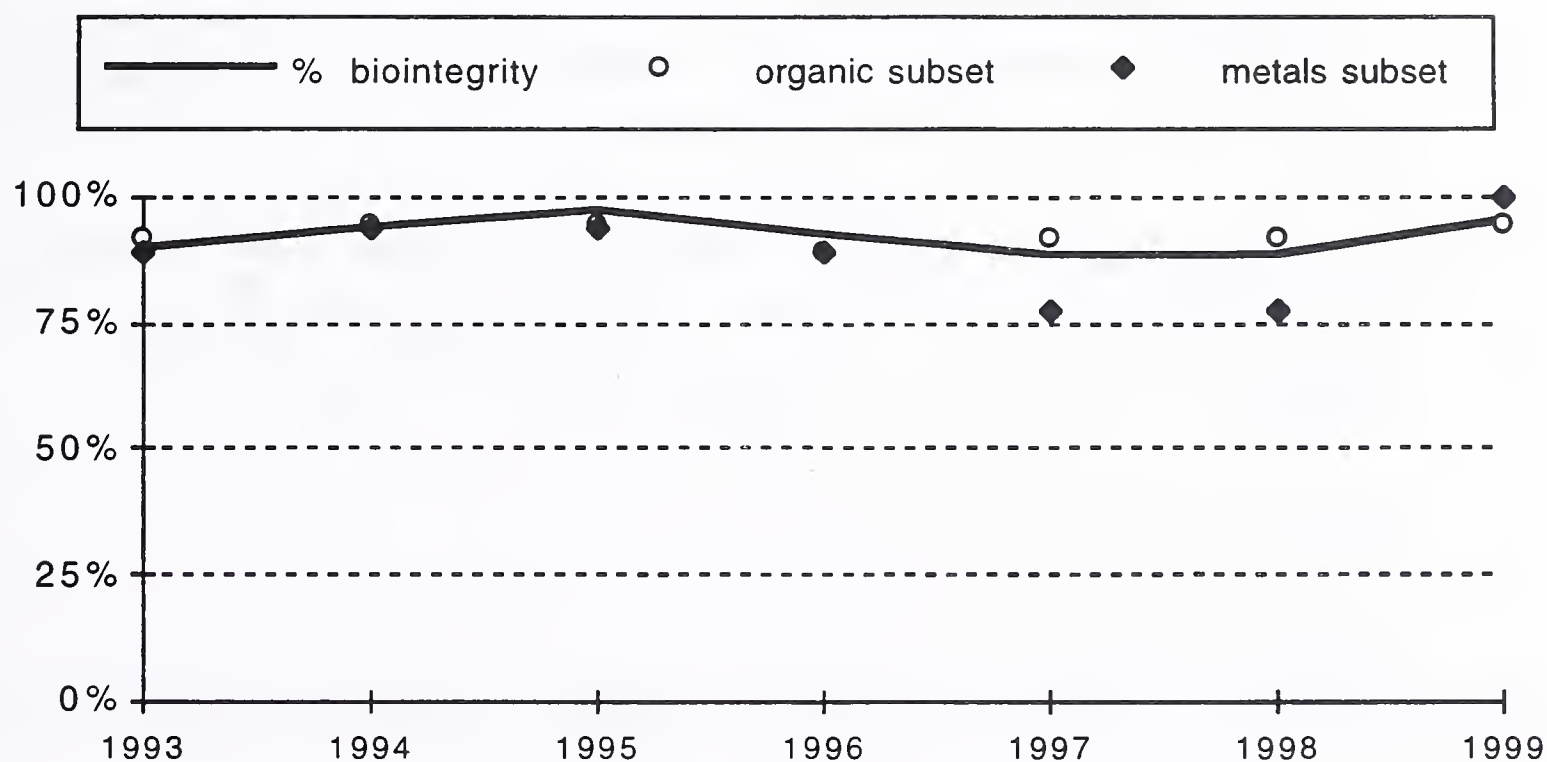
Figure 19. Biointegrity (%) in the Clark Fork River at Gold Creek Bridge (station 11), 1986-1999.
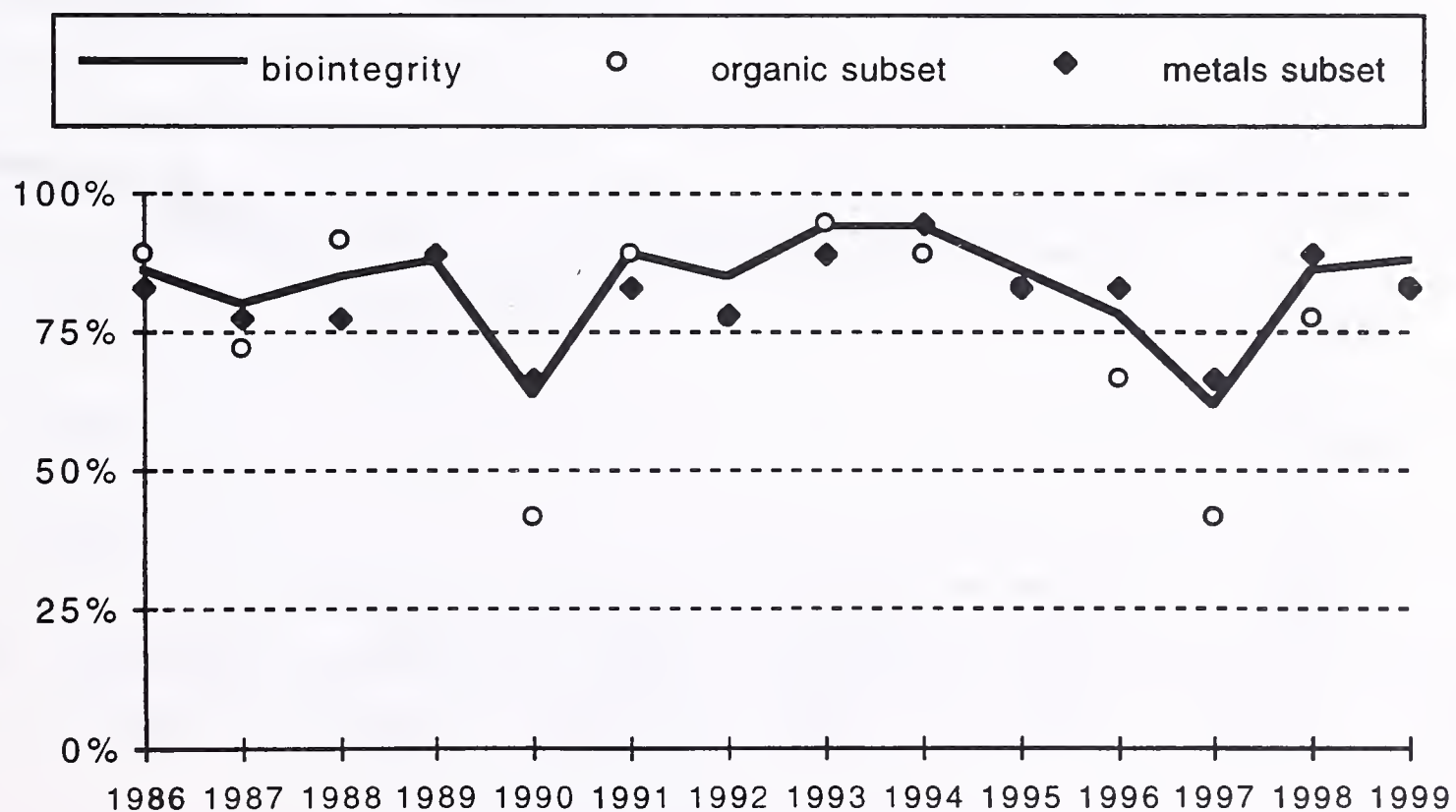
Figure 20. Biointegrity (%) in Flint Creek at New Chicago (station 11.5), 1993-1999.
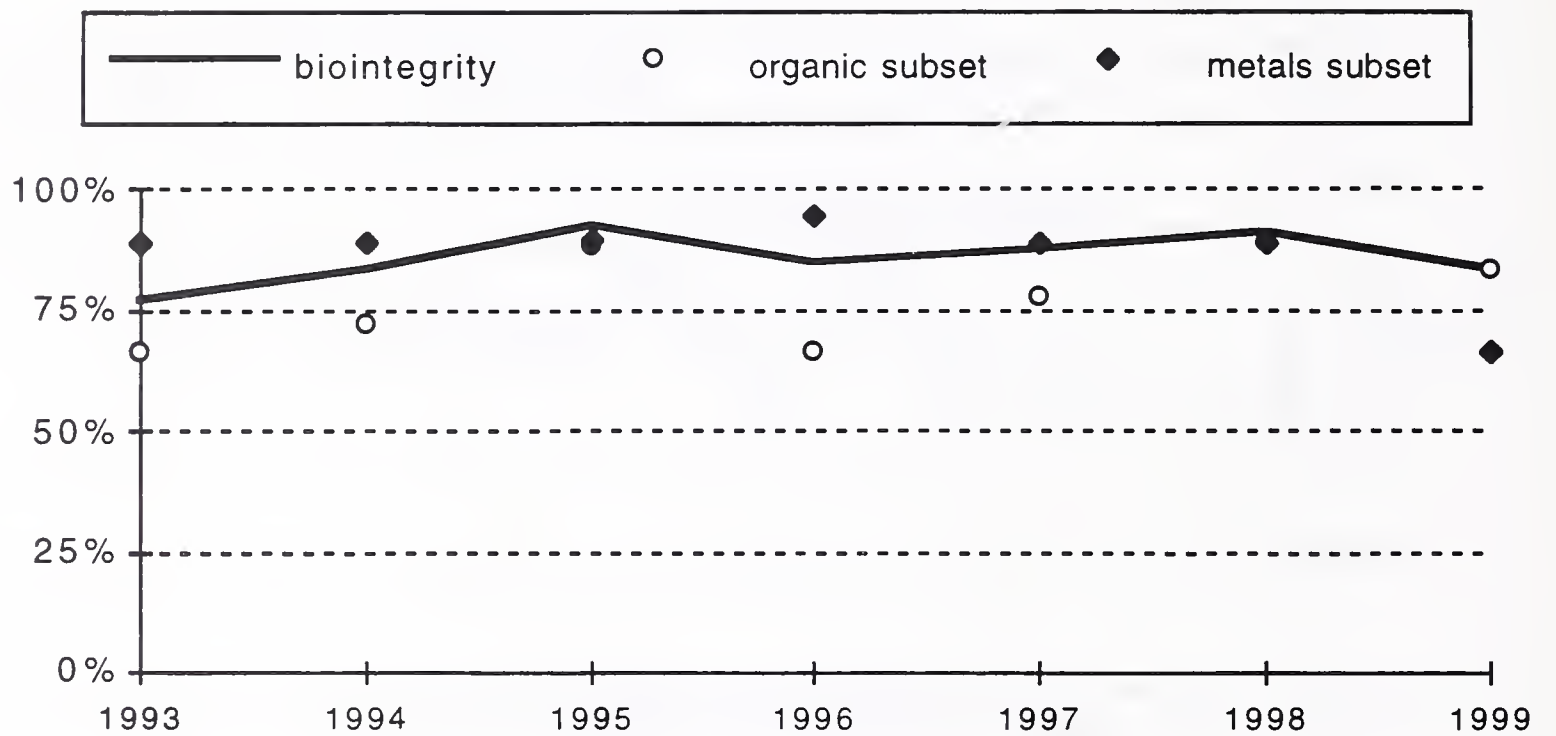
Figure 21. Biointegrity (%) in the Clark Fork River at Bearmouth (station 11.7), 1993-1999.
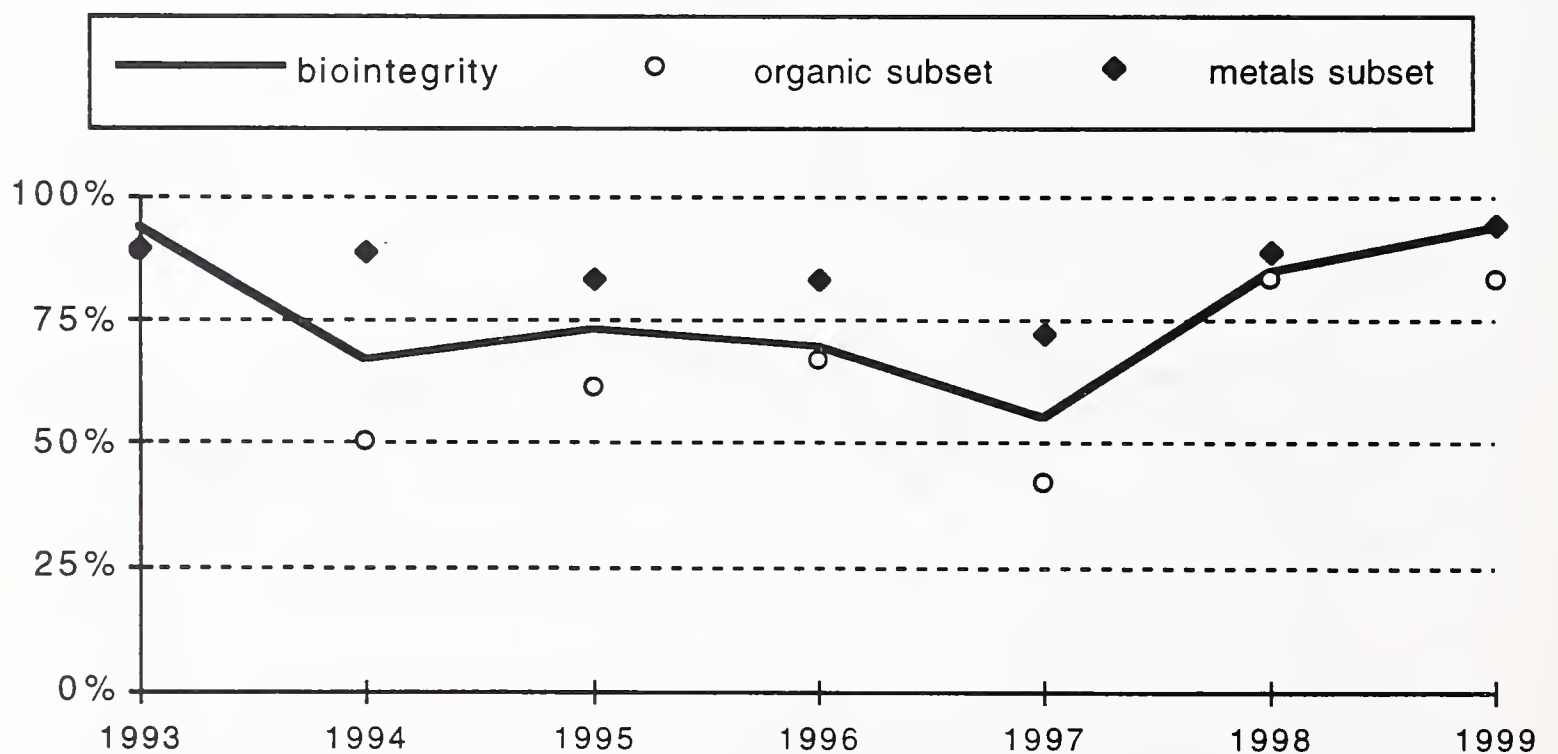
Figure 22. Biointegrity (%) in the Clark Fork River at Bonita (station 12), 1986-1999.
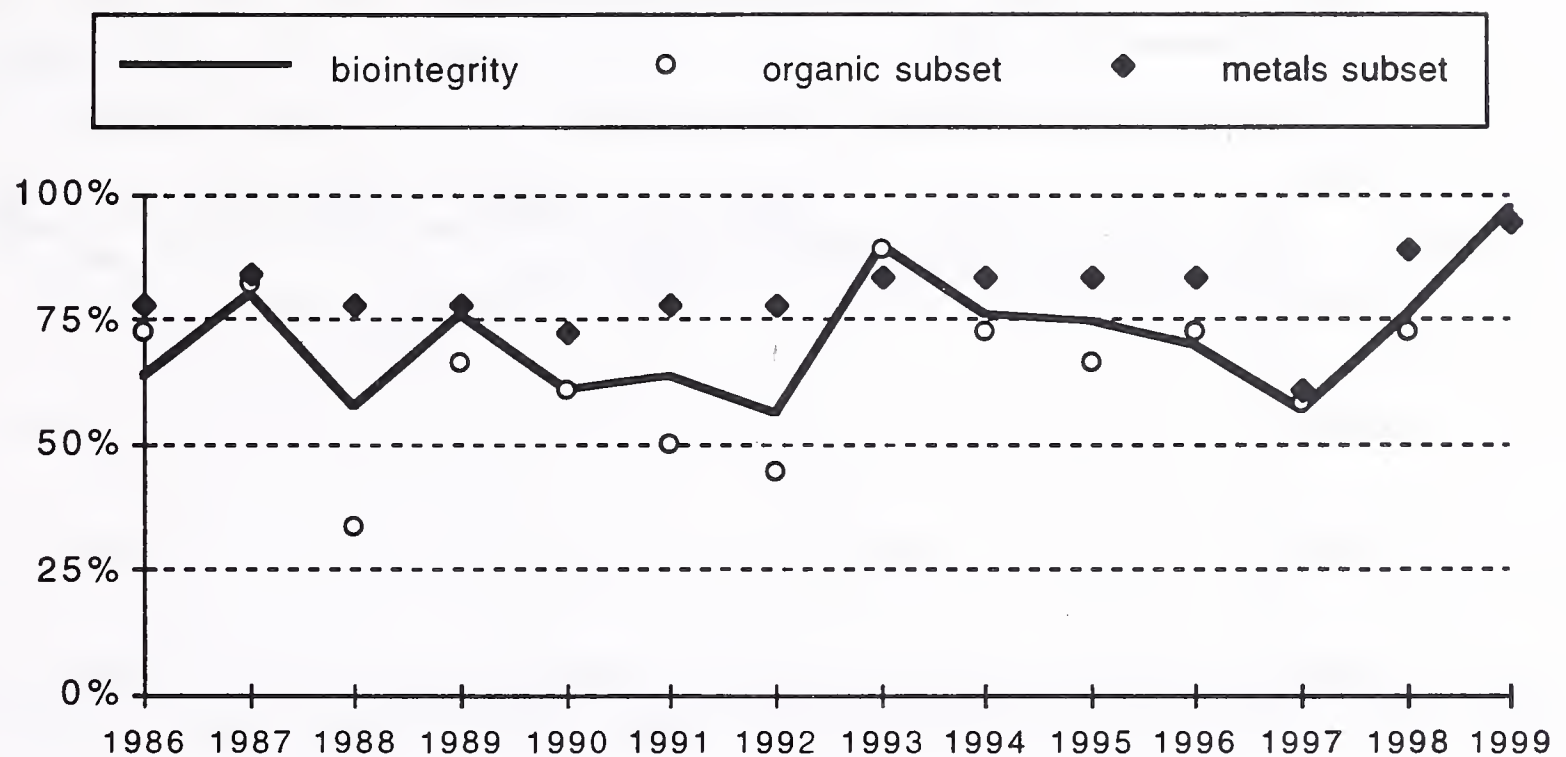
Figure 23. Biointegrity (%) in Rock Creek near mouth (station 12.5), 1993-1999.
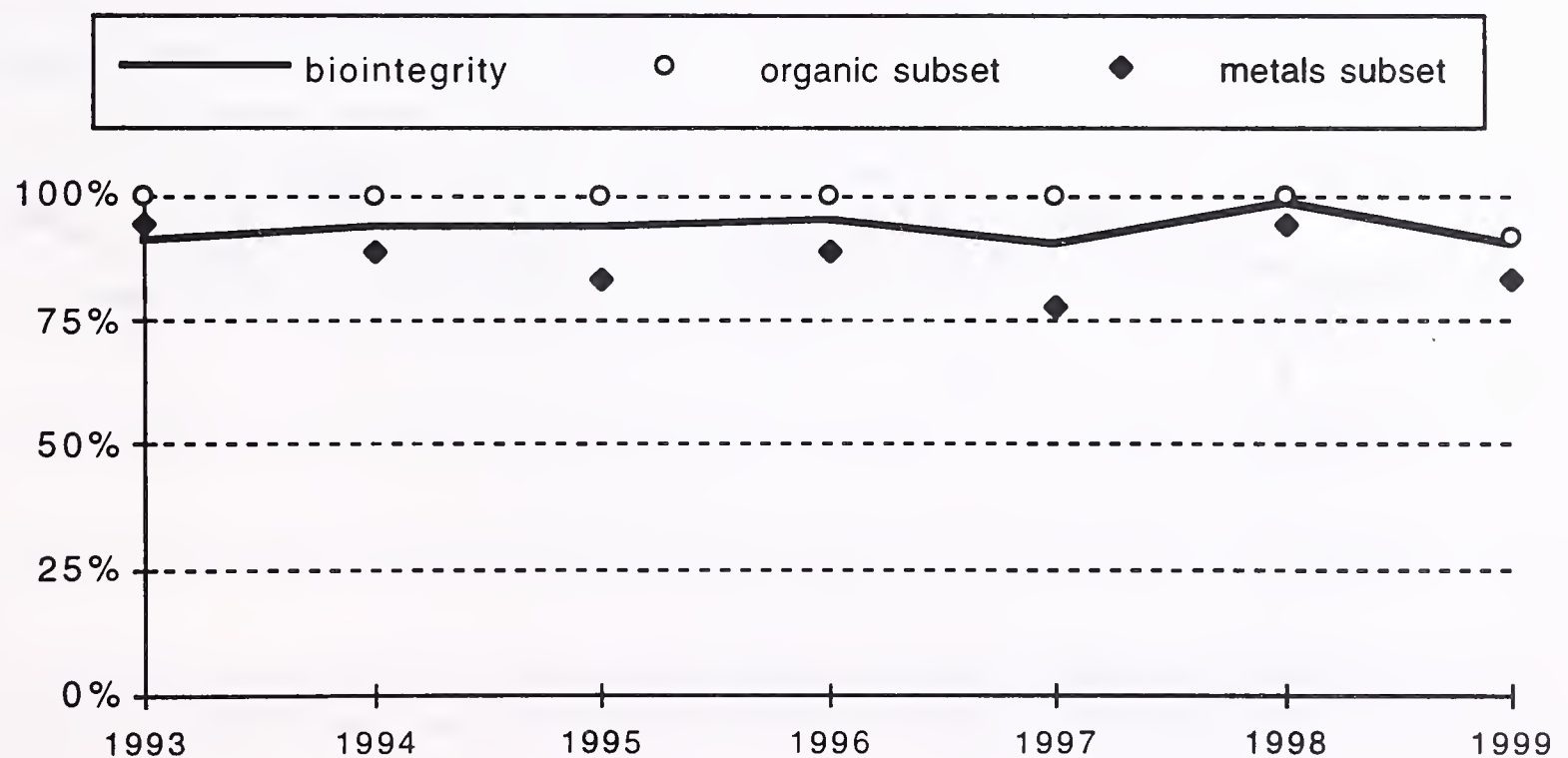
Figure 24. Biointegrity (%) in the Clark Fork River at Turah (station 13), 1986-1999.
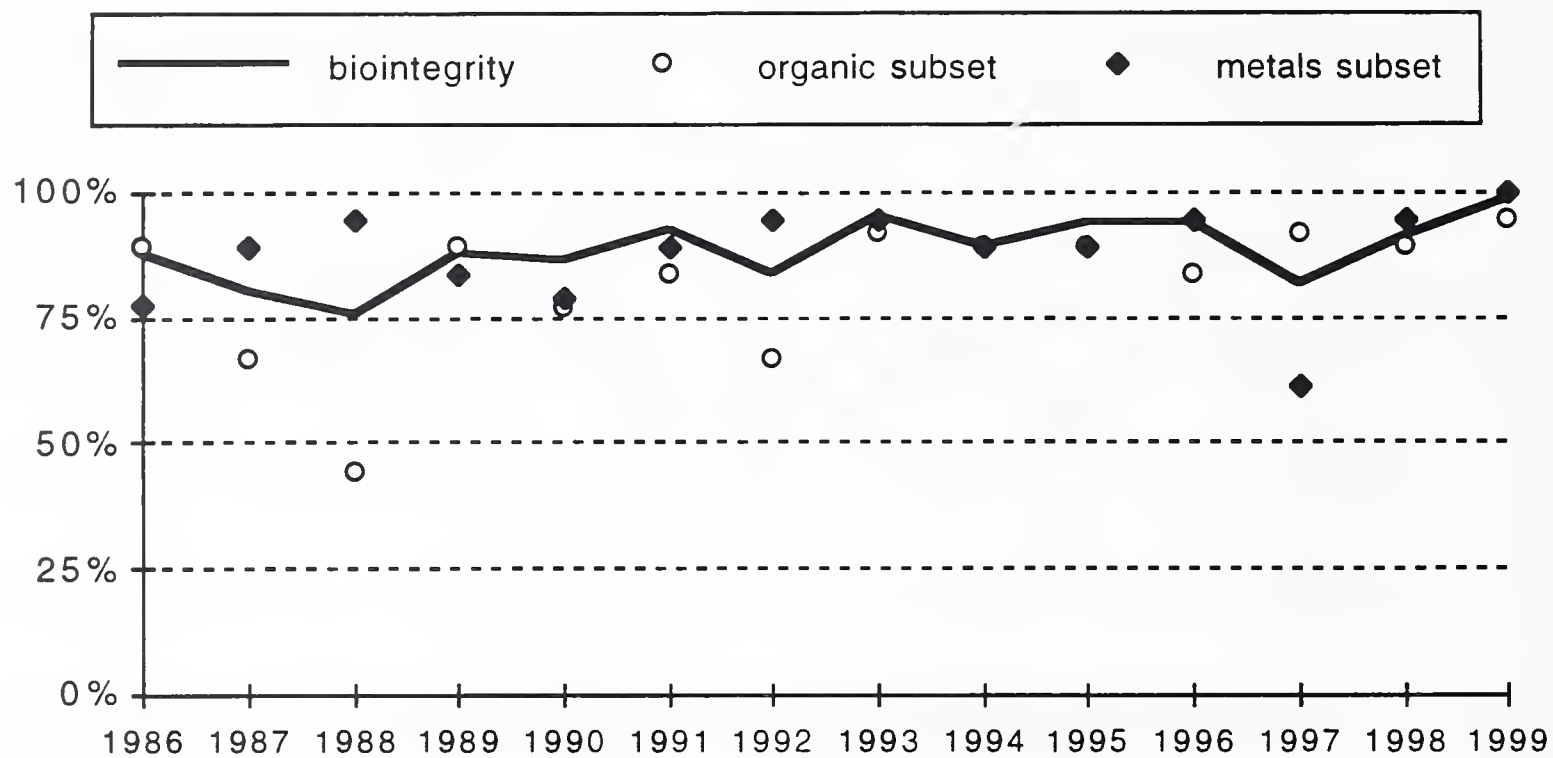
Figure 25. Biointegrity (%) in the Blackfoot River near mouth (station 14), 1986-1999.
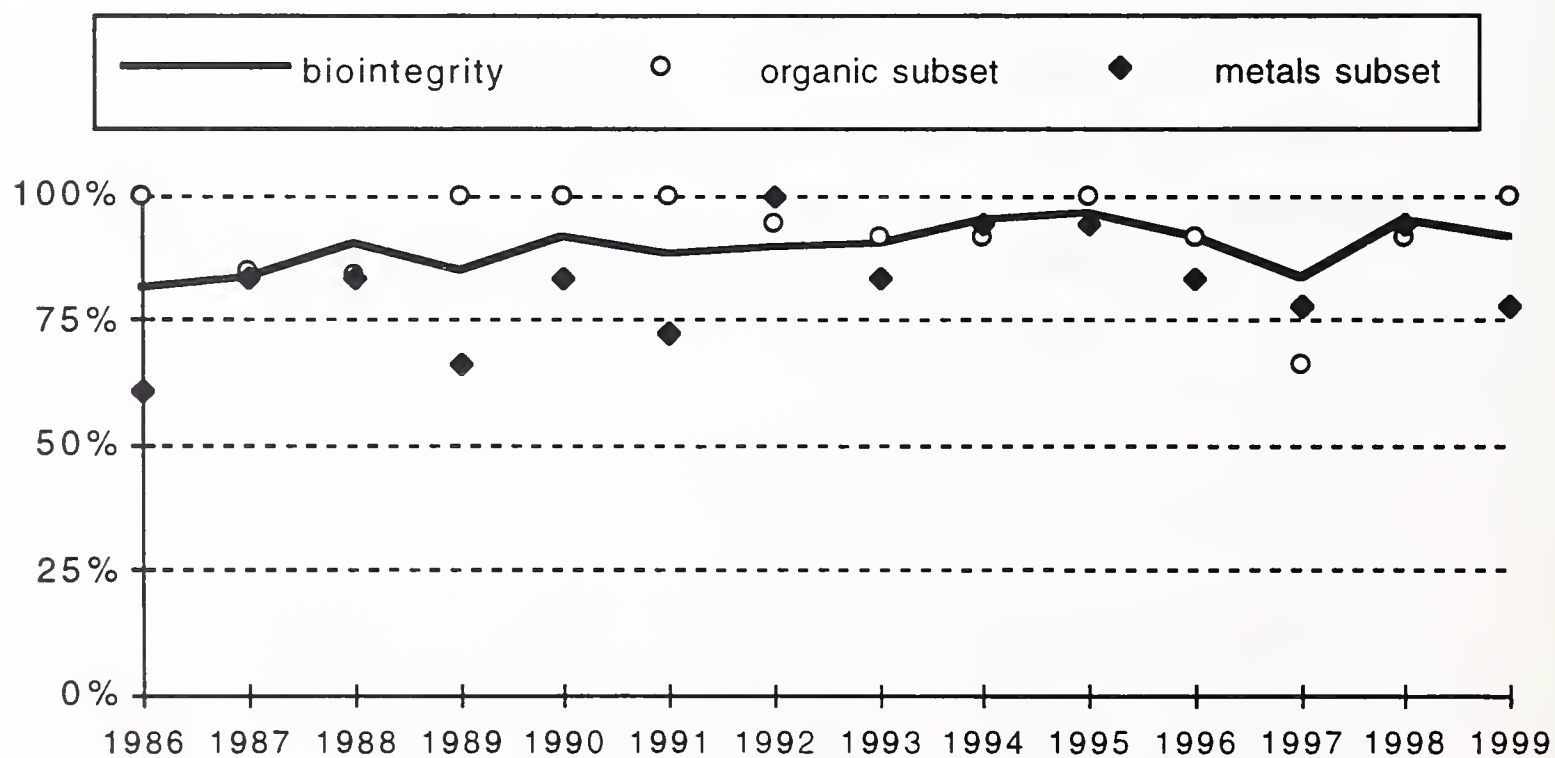
Figure 26. Biointegrity (%) in the Clark Fork River above Missoula (station 15.5), 1989-1999.
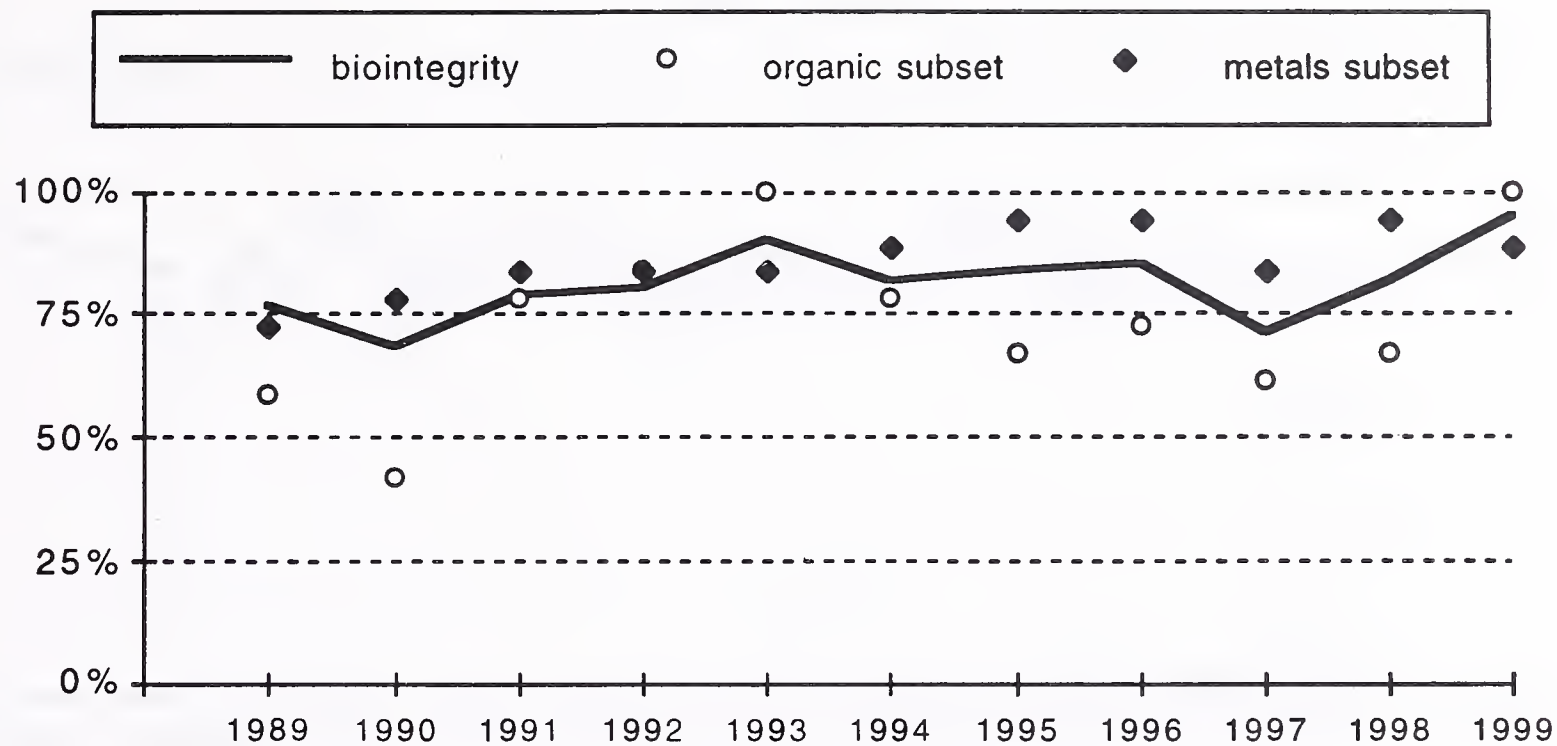
Figure 27. Biointegrity (%) in the Clark Fork River at Shuffields (station 18), 1986-1999.
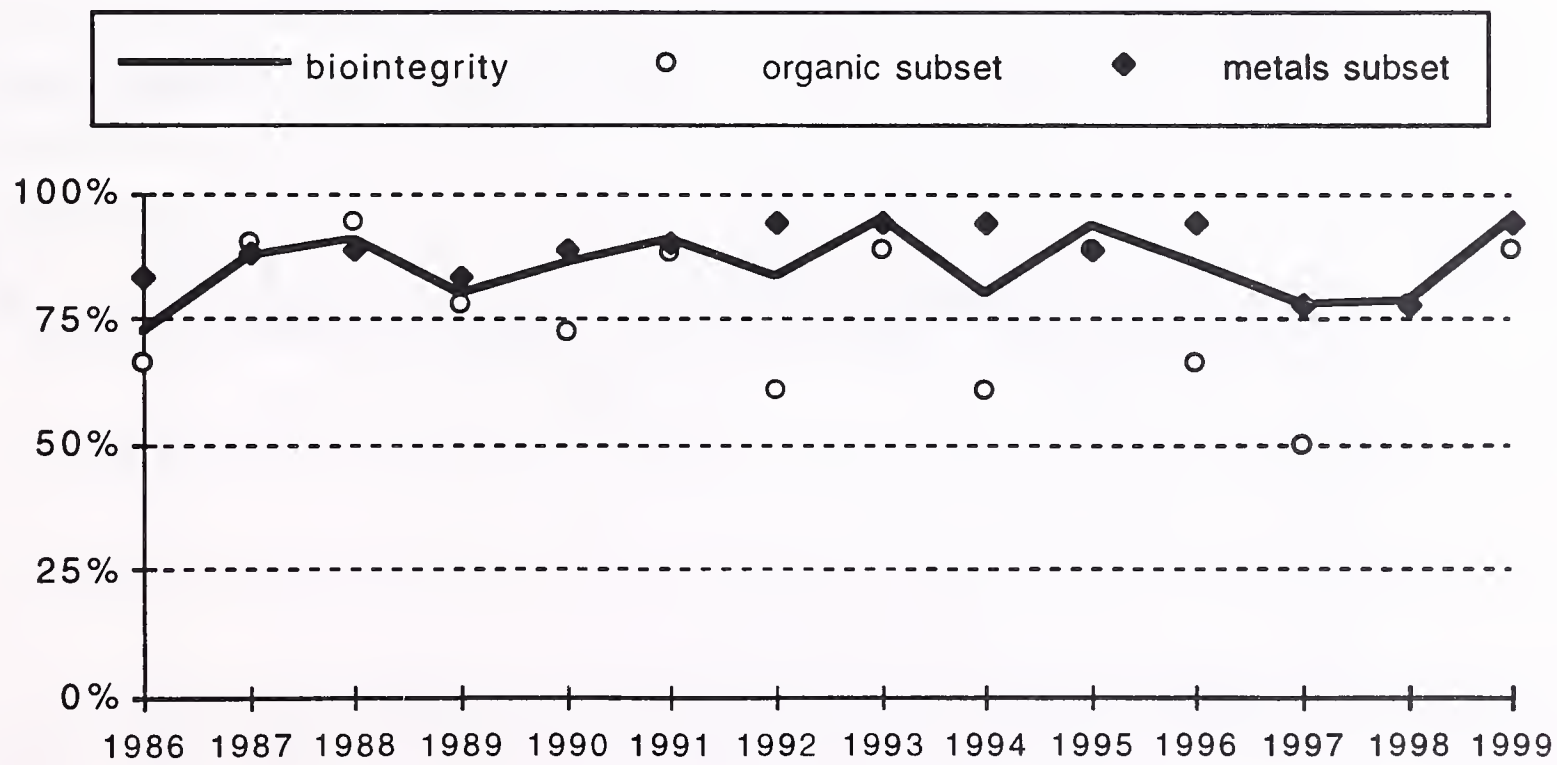
Figure 28. Biointegrity (%) in the Bitterroot River near mouth (station 19), 1986-1999.
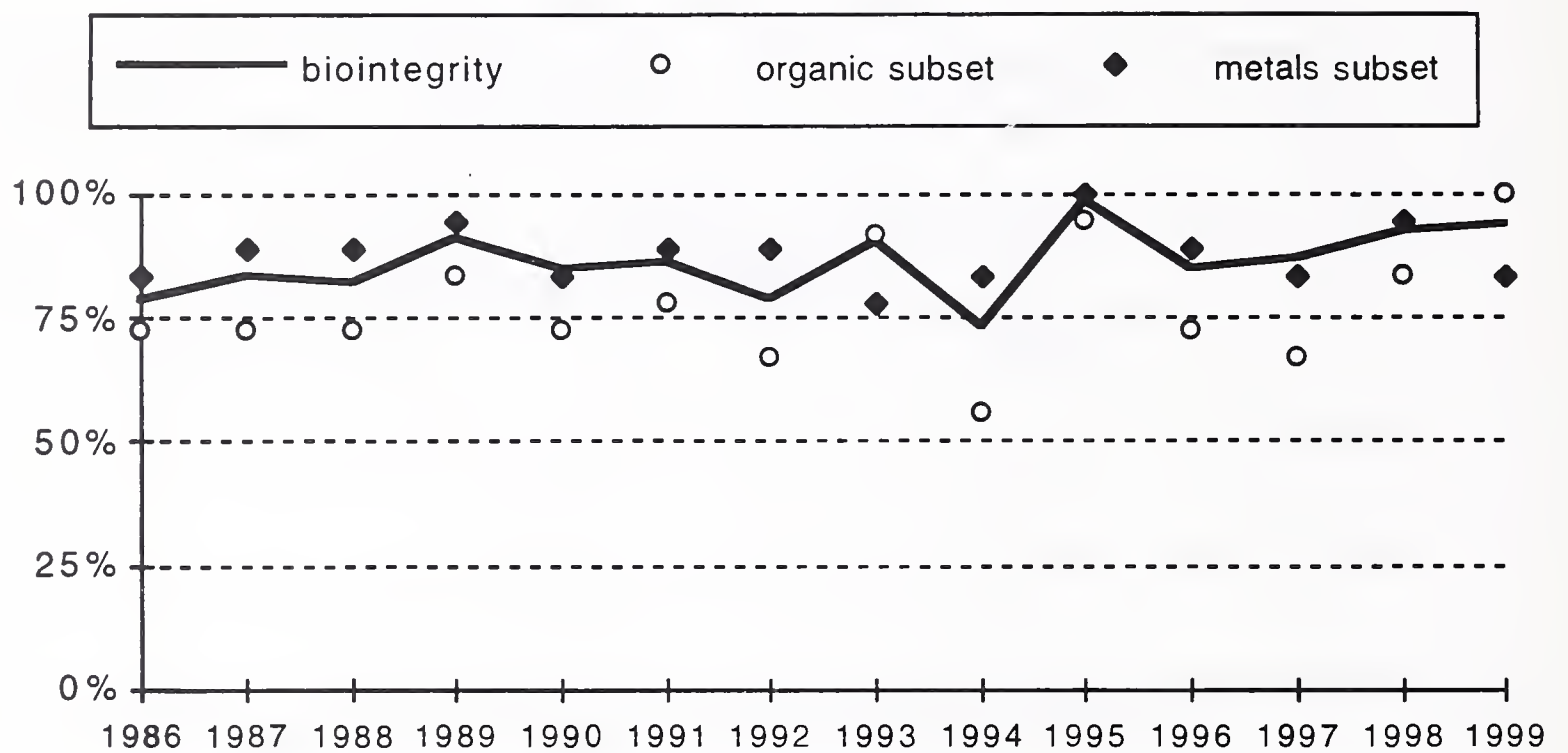
Figure 29. Biointegrity (%) in the Clark Fork River at Harper Bridge (station 20), 1986-1999.
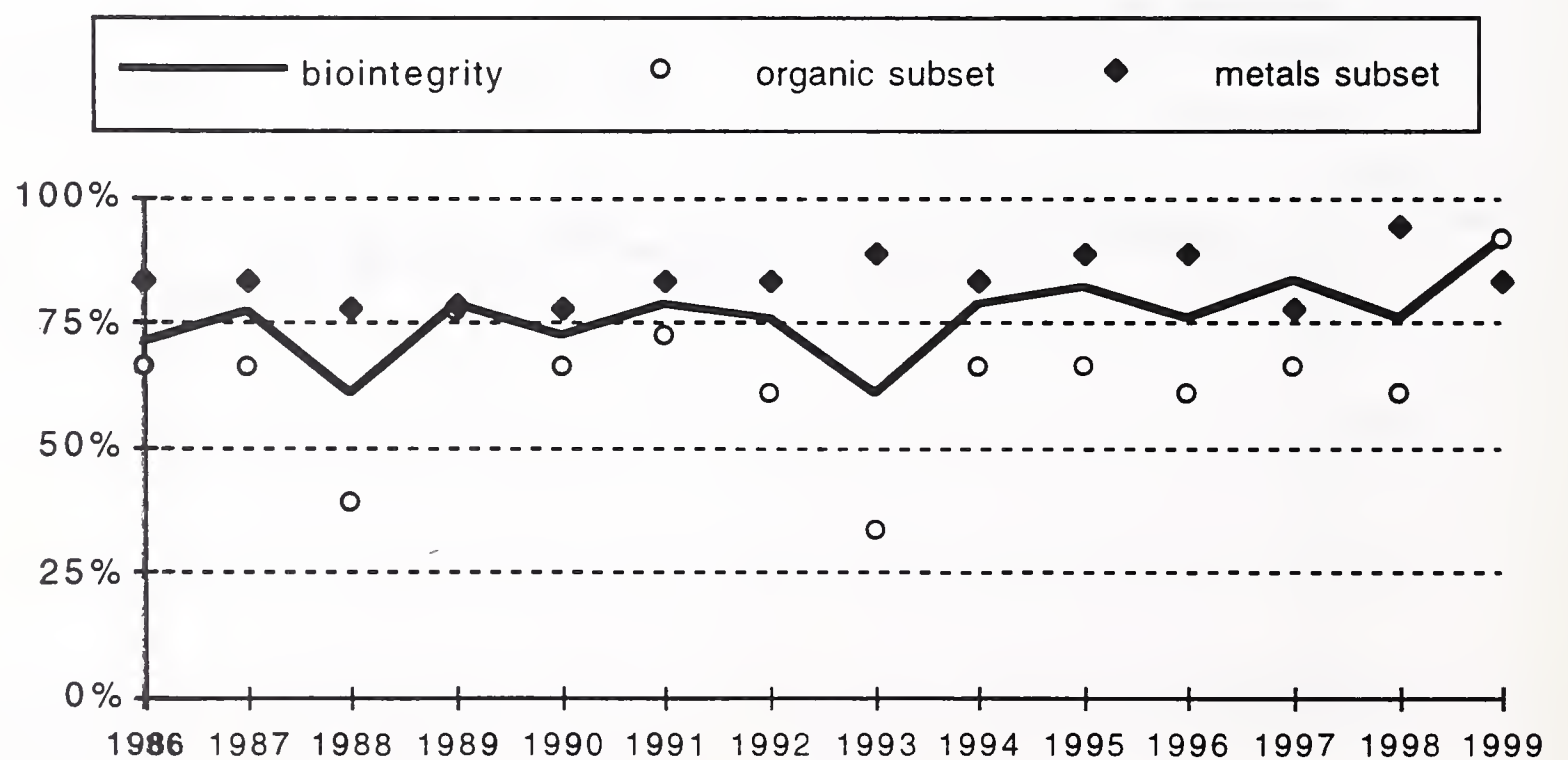
Figure 30. Biointegrity (%) in the Clark Fork River at Huson (station 22), 1986-1999.
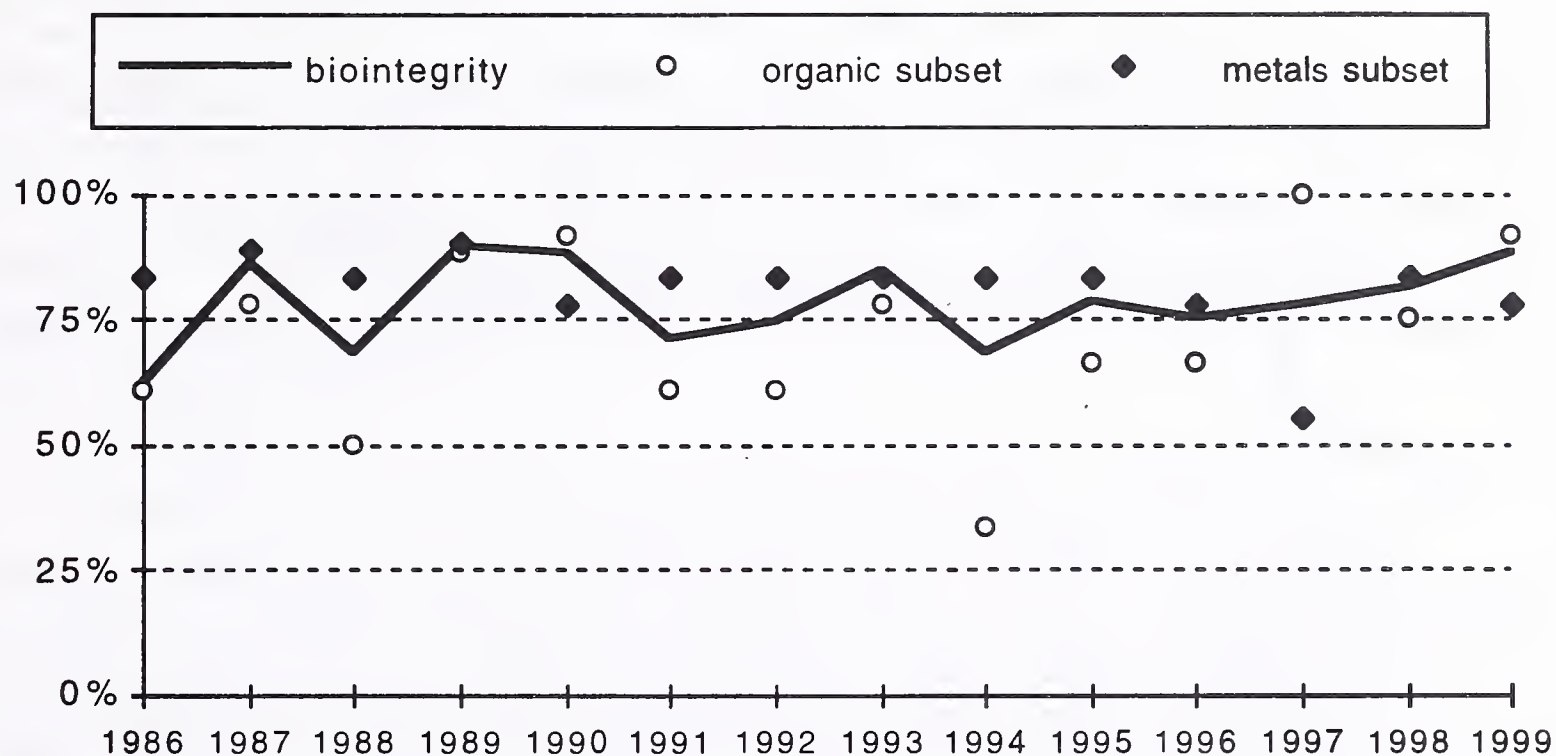
Figure 31. Biointegrity (%) in the Clark Fork River at Superior (station 24), 1986-1999.
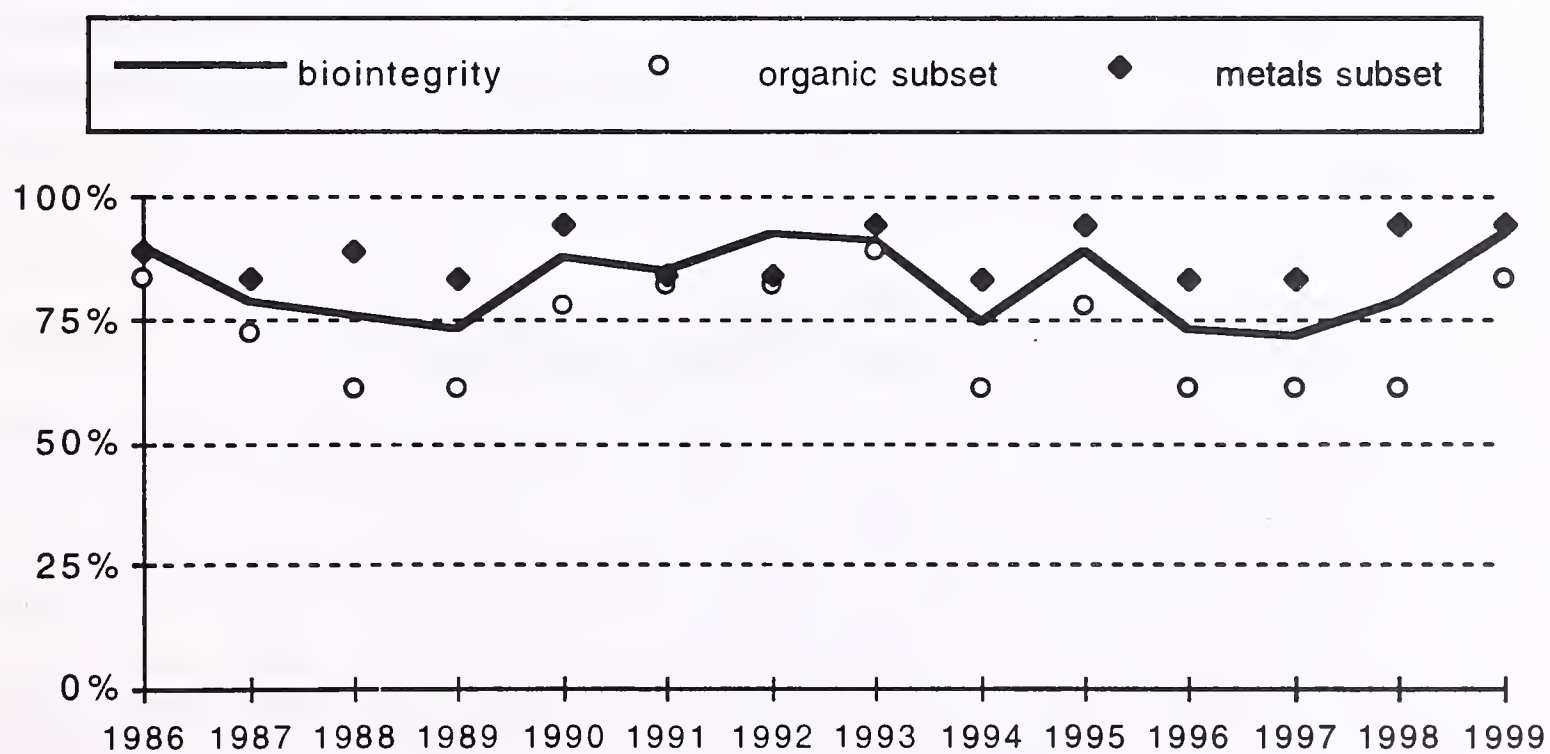
Figure 32. Biointegrity (%) in the Clark Fork River above the Flathead River (station 25), 1986-1999.
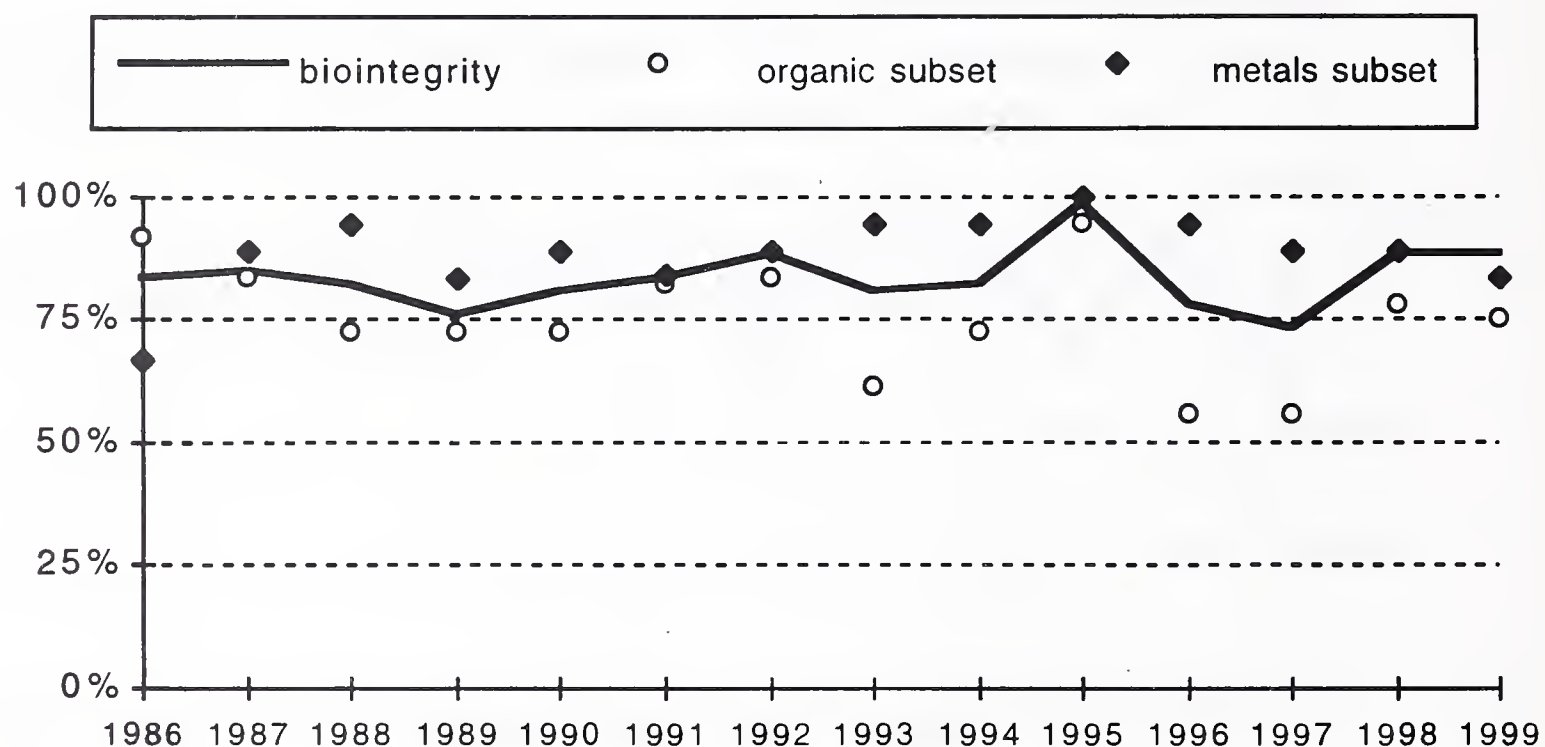
Figure 33. Biointegrity (%) in the Clark Fork River above Thompson Falls Reservoir (station 27), 1987-1999.
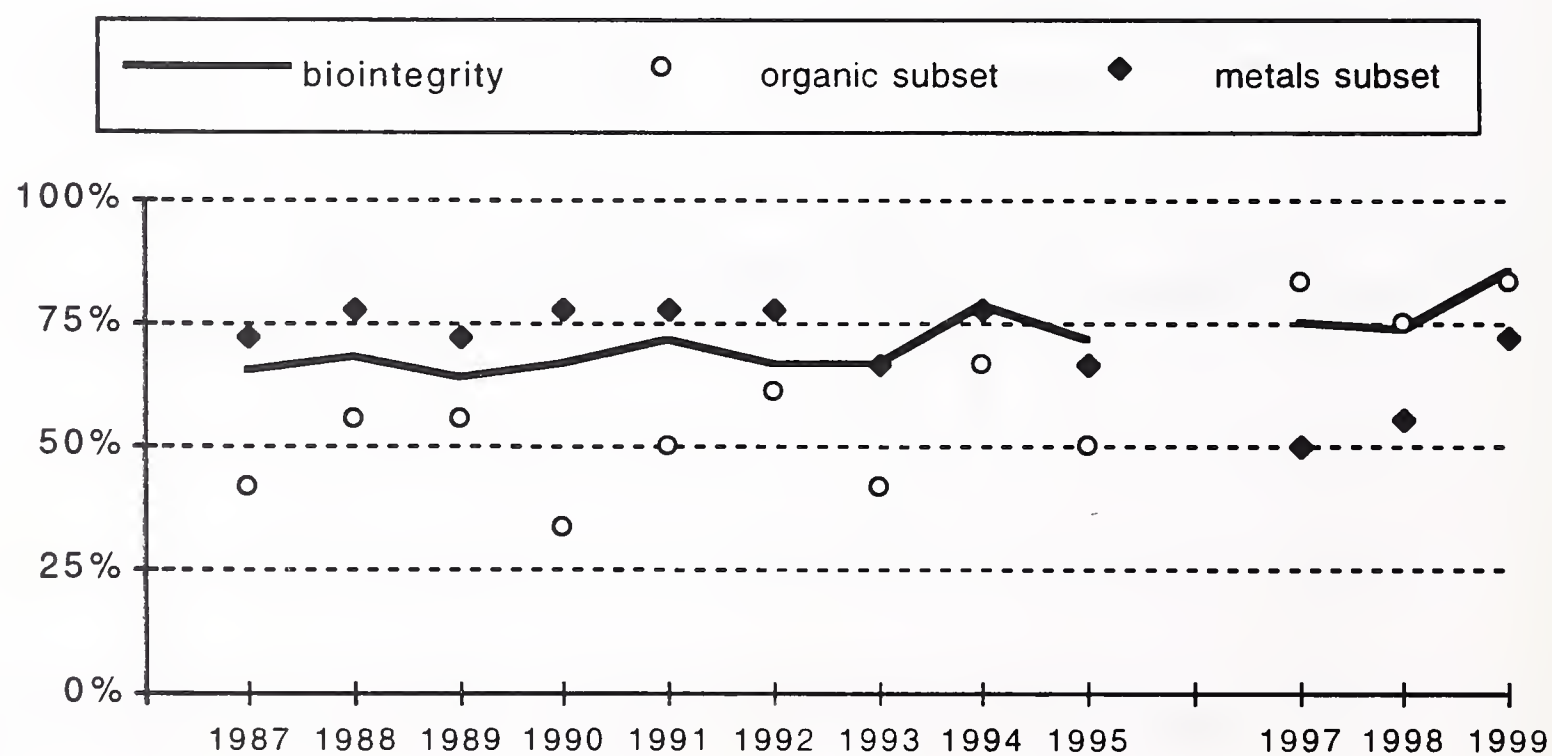
5. CONCLUSIONS

5.1 1999 Monitoring

1. Biological integrity was well above average throughout the study area in 1999. Macroinvertebrate assemblages were more species rich and diverse than at any time since monitoring begin in 1986. Macroinvertebrate-based bioassessments indicated no significant water quality problems at 15 Clark Fork River Basin sites during 1999.

2. Pollution was indicated at 12 monitoring stations in 1999. Impacts were severe in upper Silver Bow Creek, but were classified as slight elsewhere in the study area. Small reductions in biointegrity were detected in Silver Bow Creek below the Warm Springs Ponds and in the Clark Fork River from Deer Lodge to the Gold Creek Bridge. Slight biological impairment was also indicated in Blacktail Creek, Flint Creek, and 3 Clark Fork River stations downstream from Missoula.

3. Metals pollution was evident at only a few stations in the upper reaches of the basin in 1999. Upper Silver Bow Creek remained moderately to severely impaired by metals. Slight biological impairment due to metals was indicated in Blacktail Creek, in Silver Bow Creek below the Warm Springs Ponds, and in the Clark Fork River from Deer Lodge to the confluence of the Little Blackfoot River.

4. Nutrient and organic pollution were less severe and widespread than during most years. Minor impacts were detected at only six sites in 1999. Three of these sites were in Silver Bow Creek (both above and below the Warm Springs Ponds). Slight impacts from nutrients were also indicated in the Clark Fork River from Deer Lodge to the Little Blackfoot River. Nutrient/organic pollution appeared to be the primary factor limiting biological integrity in lower Silver Bow Creek and the upper Clark Fork River during 1999.

5. Biological integrity was nonimpaired in the Mill-Willow bypass in 1999. This site supported a diverse macroinvertebrate assemblage that included many metals intolerant species.

5.2 Long-term Monitoring

1. Upper Silver Bow Creek was severely impaired by metals, nutrients, and organic pollutants throughout the 14-year monitoring period. Metals were clearly the most deleterious pollutants in this reach. However, during the past four years, metals pollution has been reduced, and biological integrity has increased slightly, at the station adjacent to the Colorado Tailing.

2. Biological integrity has improved in much of the upper Clark Fork River Basin in recent years. Significant trends of improving biointegrity were evident at Silver Bow Creek sites above the Butte WWTP and below the Warm Springs Ponds, in Warm Springs Creek, and at stations in the Clark Fork River from Warm Springs Creek downstream to Dempsey. Improved biointegrity at these sites was primarily attributable to reduced metals pollution.

3 Since 1993, metals pollution in the Clark Fork River has generally been limited to the reach from Deer Lodge to the Little Blackfoot River (CFR1). Deleterious effects to the benthic macroinvertebrate community were generally slight.

4. However, metals pollution was more widespread in the upper Clark Fork River during 1997 than at any time since 1986. Metals-related impacts were evident from Deer Lodge to Turah and caused moderate biological impairment in the lower Deer Lodge Valley (CFR1). Increased metals pollution was attributed to increased metals loading associated with higher flows.

5. Nutrient and organic pollution are pervasive in the Clark Fork River and cause slight to moderate biological impairment through much of the study area.

6.   Within the Clark Fork mainstem, the reach from Deer Lodge to the Little Blackfoot River (CFR1) has the lowest biological integrity.   Moderate impairment in this reach was due to the combined effects of nutrient/organic and metals pollution.

7.   Biological integrity has improved over time in the lower Blackfoot and Bitterroot rivers and in the Clark Fork River at Turah.   Higher biointegrity scores at these sites were primarily due to recover from drought-related stresses in the late 1980's. The bioassessment also indicates a slight, but significant, reduction in metals pollution over time at the Turah site.

6. LITERATURE CITED

Clements, W. H. 1991. Community responses of stream organisms to heavy metals: A review of observational and experimental approaches. *In*: Newman M. and A. McIntosh (eds.). Metal Ecotoxicology: Concepts and Applications. Lewis Publishers.

Clements, W. H., D. S. Cherry and J. Cairns. 1988. Impact of heavy metals on insect communities in streams: A comparison of observational and experimental results. Can. J. Aquat. Sci. 45:2017-2025.

Harris, T.L. and T.M. Lawrence. 1978. Environmental requirements and pollution tolerance of Trichoptera. EPA-600/4-78-061. United States Environmental Protection Agency

Hilsenhoff, W. L. 1987. An improved biotic index of organic stream pollution. Great Lakes Entomologist. 20:31-39.

Hubbard, M.D. and W.L. Peters. 1978. Environmental requirements and pollution tolerance of Ephemeroptera. EPA-600/4-78-061. United States Environmental Protection Agency.

Ingman G. L. (ed.). 1985. Champion International Frenchtown Mill Discharge Permit. MT-0000035 - Vol. II. Montana Dept. of Health and Environmental Sciences, Water quality Bureau.

Ingman, G. L. and M. A. Kerr. 1989. Water Quality in the Clark Fork River Basin, Montana: State fiscal years 1988-1989. Montana Dept. of Health & Environmental Sciences, Water Quality Bureau.

Ingman, G. L., M. A. Kerr and D.L. McGuire. 1990. Water quality investigations in the Blackfoot River Drainage, Montana: Montana Dept. of Health & Environmental Sciences, Water Quality Bureau.

Karr, J. R. and D. R. Dudley. 1981. Ecological perspective on water quality goals. Environ. Manage. 11:249-256.

Leland, H. V., S. V. Fend, T. L. Dudley, and J. L. Carter. 1989. Effects of copper on species composition of benthic insects in a Serria Nevada, California, stream. Freshwater Biol. 21:361-365.

Lynch, T. R., C. J. Popp, and G. Z. Jacobi. 1988. Aquatic insects as environmental monitors of trace metal contamination: Red River, New Mexico. Water Air Soil Pollution. 42: 19-31.

McGuire, D. L. 1999. Clark Fork River macroinvertebrate community biointegrity, 1997 and 1998 assessments. Technical report prepared for the Montana Department of Environmental Quality/ Planning, Prevention and Assistance Division.

McGuire, D. L. 1998. Clark Fork River macroinvertebrate community biointegrity, 1996 assessment. Technical report prepared for the Montana Department of Environmental Quality/ Planning, Prevention and Assistance Division.

McGuire, D. L. 1997. Clark Fork River macroinvertebrate community biointegrity, 1995 assessment. Technical report prepared for the Montana Department of Environmental Quality/ Planning, Prevention and Assistance Division.

McGuire, D. L. 1996a. Clark Fork River macroinvertebrate community biointegrity, 1994 assessment. Technical report prepared for the Montana Department of Environmental Quality/ Water Quality Division.

McGuire, D. L. 1996b. Macroinvertebrate community biointegrity in Warm Springs, Mill, and Willow Creeks: Anaconda NPL Site. Technical report prepared for U.S. EPA, Region VIII, Montana Office.

McGuire, D. L. 1995. Clark Fork River macroinvertebrate community biointegrity, 1993 assessment. Technical report prepared for the Montana Department of Health and Environmental Sciences/Water Quality Division.

McGuire, D. L. 1993. Clark Fork River macroinvertebrate community biointegrity, 1986 through 1992. Technical report prepared for the Montana Department of Health and Environmental Sciences/Water Quality Bureau.

McGuire, D. L. 1992. Montana Reference streams project: 1991 aquatic macroinvertebrate surveys. Technical report prepared for the Montana Department of Health and Environmental Sciences/Water Quality Bureau.

McGuire, D. L. 1990a. Aquatic macroinvertebrate surveys in the Clark Fork River, 1986 to 1988. In: V. Watson (ed.). Clark Fork River Symposium Proceedings. Mont. Acad. Sci. Missoula MT.

McGuire, D. L. 1990b. Aquatic macroinvertebrate survey of the Blackfoot River, Montana: August, 1988 and 1989. Technical report prepared for the Montana Department of Health and Environmental Sciences/Water Quality Bureau.

McGuire, D. L. 1989a. Clark Fork River aquatic macroinvertebrate survey, August, 1987. Technical report prepared for the Montana Department of Health and Environmental Sciences/Water Quality Bureau.

McGuire, D. L. 1989b. Clark Fork River aquatic macroinvertebrate survey, August, 1988. Technical report prepared for the Montana Department of Health and Environmental Sciences/Water Quality Bureau.

McGuire, D. L. 1987. Clark Fork River macroinvertebrate study, 1986. Technical report prepared for the Montana Governor's Office and Montana Water Quality Bureau.

McGuire, D. L. and G.L. Ingman 1996. Clark Fork River macroinvertebrate community biointegrity, 1994 assessment. Technical report prepared for the Montana Department of Environmental Quality.

Merritt, R. W. and K.W. Cummins. 1984. An introduction to the aquatic insects of North America. 2nd Ed. Kendall/Hunt Publishing Co. Dubuque, Iowa.

Meyer, J. L. 1997. Stream health: incorporating the human dimension to advance stream ecology. Journal of the North American Benthological Society 16:439-447.

Montana Dept. of Environmental Quality. 1996. Field Procedure Manual: collection, analysis and reporting of water quality samples. Water Quality Division.

MultiTech and OEA Research. 1986. Silver Bow Creek remedial investigation, Appendix E - macroinvertebrate investigation. Montana Dept. of Health and Environmental Sciences.

Plafkin, J. L., M. T. Barbour, K. D. Porter, S. K. Gross, and R. M. Hughes. 1989. Rapid bioassessment protocols for use in streams and rivers: benthic macroinvertebrates and fish. U.S. EPA/444/4-89-001.

R2 Resource Consultants. 1999. Mill-Willow Bypass, Montana. biomonitoring report 1997/1998. Report prepared for ARCO Environmental Remediation, L.L.C. Anaconda, Montana.

Rolin, R. A. 1988. The effects of heavy metal pollution of the upper Arkansas River on the distribution of aquatic macroinvertebrates. Hydrobiologia 160:3-8.

Spindler, J. C. 1959. An extensive chemical, physical, bacteriological, and biological survey - Columbia River Drainage in Montana. Water Pollution Control Report No. 59-1, Montana State Board of Health.

Weber, C. I. (ed). 1973. Biological field and laboratory methods for measuring the quality of surface waters and effluents. U. S. EPA. Cincinnati, OH. (670/4-73-001).

Wiederholm, T. 1984. Responses of aquatic insects to environmental pollution. *In*. Resh, V. H. and D. M. Rosenberg (eds.). The Ecology of Aquatic Insects. Praeger Publ. New York.

Winner, R. W., M. W. Boessel and M. P. Farrel. 1980. Insect community structure as an index of heavy-metal pollution in lotic ecosystems. Can. J. Fish. Aq. Sci. 37:647-55.

Yasuno, M., S. Hataeyama and Y. Sugaya. 1985. Characteristic distribution of chironomids in rivers polluted with heavy metals. Verh. Int. Ver. Limnol. 22:2371-2377.

Zar, J. H. 1974. Biostatistical analysis. Prentice-Hall, Inc. NJ.

APPENDIX A:

Macroinvertebrate checklist for the Clark Fork Basin
with biotic and metals tolerance values

Appendix A. Aquatic macroinvertebrates collected from the Clark Fork River Basin during August, 1986-1999 and tolerance values used to calculate biotic and metals tolerance indices.

class order family	genus species	biotic index	metals tolerance
INSECTA			
Coleoptera			
Dytiscidae			7
	Agabetes sp.		
	Agabinus sp.		
	Agabus sp.		
	Deronectes sp.		
	Hydroporus sp.		
	Hydrovatus sp.		
	Hygrotus sp.		
	Illybius sp.		
	Oreodytes spp.		
Elmidae			
	Cleptelmis ornata	4	4
	Dubiraphia sp.	6	4
	Heterlimnius corpulentus	3	3
	Lara avara	1	1
	Microcylloepus sp.	5	4
	Narpus concolor	2	1
	Optioservus spp.	5	5
	Ordobrevia sp.	5	3
	Stenelmis sp.	5	3
	Zaitzevia parvula	4	3
Haliplidae		5	7
	Brychius sp.		
	Haliplus sp.		
	Peltodytes sp.		
Hydrophilidae			7
Plecoptera			
Capniidae		1	0
Chloroperlidae			
	Chloroperlinae	1	2
	Kathroperla perdita	1	2
Nemouridae			
	Amphinemura sp.	2	1
	Zapada cinctipes	3	3
	Zapada oregenensis gp.	2	2
	Malenka sp.	1	1
Perlidae			
	Calineuria califomica	2	3
	Claassenia sabulosa	3	3
	Doroneuria sp.	1	3
	Hesperoperla pacifica	1	3
Perlodidae			
	Cultus sp.	2	2
	Isoperla fulva	2	3
	Isoperla quinquepunctata	2	2
	Isogenoides sp.	3	2
	Skwala sp.	3	3
Pteronarcidae			
	Pteronarcella badia	3	4
	Pteronarcys californica	2	1
Taeniopterygidae		2	1
Diptera			
Chironomidae			
Tanypodinae			
	Ablabesmyia sp.	8	3
	Alotanypus sp.	6	8
	Brundiniella sp.	3	7
	Macropelopia sp.	6	5
	Nilotanypus sp.	6	3
	Thienemannimyia gp.	5	3
	Pentaneura sp.	6	2
	Procladius sp.	9	5

Appendix A. continued.

class order family genus species	biotic index	metals tolerance
Chironomidae (cont.)		
Diamesinae		
Diamesa sp.	5	9
Pagastia sp.	1	9
Potthastia gaedii gp.	2	5
P. longimanus gp.	2	5
Sympotthastia sp.	2	4
Prodiamesinae		
Monodiamesa sp.	7	5
Odontomesa sp.	4	5
Prodiamesa sp.	3	3
Orthocladinae		
Brillia sp.	4	4
Cardiocladius spp.	5	9
Corynoneura sp.	7	4
Cricotopus spp.	7	10
C. (Nostococladius) sp.	6	5
Eukiefferiella spp.	8	9
E. (devonica) gp.	8	7
Nanocladius sp.	3	4
Orthocladius spp.	6	5
Parametriocnemus sp.	5	4
Paraphaenocladius sp.	4	4
Rheocricotopus sp.	4	5
Symbiocladius sp.	4	1
Synorthocladius sp.	2	1
Tvetenia sp.	5	4
Chironominae		
Chironomini		
Chironomus sp.	10	7
Cryptochironomus sp.	8	5
Demicryptochironomus sp.	8	4
Dicrotendipes sp.	8	5
Endochironomus sp.	10	6
Glyptotendipes sp.	10	4
Microtendipes sp	6	4
Parachironomus sp.	10	4
Paracladopelma sp.	7	4
Phaenopsectra sp	7	4
Polypedilum spp.	6	4
Psuedochironomus sp.	5	4
Robackia sp.	7	4
Stictochironomus sp.	5	4
Xenochironomus sp.	4	0
Tanytarsini		
Cladotanytarsus sp.	7	3
Micropsectra spp.	4	1
Paratanytarsus sp.	6	3
Stempellina sp.	2	0
Sublettia sp.	2	0
Rheotanytarsus sp.	6	1
Tanytarsus sp.	6	3
Tipulidae		
Antocha sp.	3	4
Dicranota sp.	3	2
Hesperoconpa sp.	1	1
Hexatoma sp.	2	2
Limnonia (?) sp.	3	2
Limnephila sp.	3	3
Ormosia (?) sp.	6	3
Tipula sp.	4	3
Rhabdomastix sp.	1	1
Athericidae		
Atherix pachypus	4	4

class order family	genus species	biotic index	metals tolerance
Diptera (cont.)			
Simuliidae			
	Simulium (Eusimulium) spp.	5	5
	Simulium (Psilozoa) sp.	7	7
Empididae			
	Chelifera sp.	5	4
	Clinocera sp.	5	4
	Hemerodromia sp.	6	4
Tanyteridae			
	Protanyderus sp.	5	1
Muscidae			
	Limnophora sp.	6	7
Ceratopogonidae			
	Certatopogoninae	6	4
Culicidae			
	Aedes sp.	7	5
Dolichopodidae		4	4
Tabanidae		6	3
Stratiomyidae			
	Euparyphus sp.	7	4
Psychodidae			
	Pericoma sp.	4	4
Hemiptera			
Corixidae			5
	Hesperocorixa laevigata		
	Sigara sp.		
Saldidae			
	Salda sp.		
Lepidoptera			
Pyralidae			
	Petrophila sp.	5	3
Megaloptera			
Sialidae			
	Sialis sp.	4	4
Odonata			
Gomphidae			
	Ophiogomphus sp.	5	4
Ephemeroptera			
Baetidae			
	Acentrella insignificans	4	4
	A. turbida	4	3
	Baetis punctiventris (Psuedocloeon)	6	3
	B. tricaudatus	4	5
	Callibaetis sp.	9	1
	Centroptilum sp.	2	1
	Diphetor hageni	5	1
Ephemerellidae			
	Attenella margarita	3	1
	Caudatella heterocaudata	0	0
	C. hystrix	0	0
	Drunella coloradensis	0	0
	D. doddsi	1	0
	D. grandis	2	1
	Ephemerella inermis	4	3
	Serratella tibialis	2	1
	Timpanoga hecuba	2	1
Heptageniidae			
	Cinygmula sp.	0	0
	Epeorus spp.	2	0
	E. albertae	2	0
	E. grandis	0	0
	E. longimanus	1	0
	Heptagenia soltari	3	1
	Nixe sp.	4	1
	Rhithrogena sp.	0	2
	Stenonema (termintum)?	4	1

class order family genus species	biotic index	metals tolerance
Ephemeroptera (cont.)		
Leptophlebiidae		
Paraleptophlebia spp.	1	1
P. bicornuta	2	1
P. debilis	1	1
Siphlonuridae		
Ameletus sp.	0	1
Tricorythidae		
Tricorythodes minutus	4	4
Trichoptera		
Brachycentridae		
Amiocentrus aspilus	3	1
Brachycentrus americanus	1	4
Brachycentrus occidentalis	2	3
Micrasema bactro	1	2
Glossosomatidae		
Agapetus sp.	0	2
Glossosoma sp.	0	2
Protoptila sp.	1	2
Helicopsycidae		
Helicopsyche sp.	3	3
Hydropsychidae		
Arctopsyche grandis	2	3
Cheumatopsyche spp.	5	5
Hydropsyche spp.	5	5
H. (H.) occidentalis	5	5
H. (Ceratopsyche) spp.	5	5
H.(C.) cockerelli	4	4
H. (C.) morosa?	6	5
H. (C.) oslari/tana	3	6
H. (C.) slossonae	4	6
Hydroptilidae		
Hydroptila spp.	6	4
Leucotrichia pictipes	2	1
Neotrichia sp.	2	2
Ochrotrichia sp.	4	3
Oxyethira sp.	3	2
Stactobiella sp.	2	3
Zumatrichia notosa	3	1
Lepidostomatidae		
Lepidostoma sp.	1	1
Leptoceridae		
Ceraclea sp.	3	1
Oecetis sp.	8	3
Nectopsyche sp.	3	3
Trianodes sp.	6	1
Limnephilidae		
Dicosmoecus sp.	2	1
Ecclisomyia sp.	4	2
Limnephilus sp.	3	2
Onocosmoecus sp.	3	2
Neophylax sp.	3	2
Psychoglypha sp.	0	2
Philopotamidae		
Wormaldia sp.	0	1
Polycentropididae		
Polycentropus sp.	6	1
Psychomyiidae		
Psychomyia sp.	2	1
Rhyacophilidae		
Rhyacophila angelita gp.	0	1
R. coloradensis gp.	0	1
R. brunnea gp.	2	1

Appendix A. concluded.

class order family	genus species	biotic index	metals tolerance
ANNELIDA			
Oligochaeta			
Enchytraeidae		4	1
Lumbricidae		4	1
Lumbriculidae		4	1
Naididae		8	5
Tubificidae		10	6
Hirudinea			
Erpobdellidae		8	4
Glossophoniidae		9	4
	Glossiphonia complanata	9	4
	Helobdella stagnalis	10	4
CRUSTACEA			
Amphipoda			
Gammaridae			
	Gammarus sp.	4	1
Talitridae			
	Hyalella azteca	8	3
Isopoda			
Asellidae			
	Caecidotea sp. (Asellus)	8	5
Decapoda			
Astacidae			
	Pacifasticus sp.	6	3
MOLLUSCA			
Gastropoda			
Ancyclidae			
	Ferrissia rivularis	6	1
Lymnaeidae			
	Fossaria spp.	6	3
	Stagnicola sp.	6	3
	Fisherola nutalli	3	1
	Radix auricularia	8	1
Physidae			
	Physella sp.	8	4
Planorbidae			
	Gyraulus sp.	8	3
Valvatidae			
	Valvata humeralis	3	1
Pelecypoda			
Sphaeriidae		8	3
TURBELLARIA		4	3
NEMATODA		5	5
NEMATOMORPHA		5	5
PORIFERA		0	0
ACARI		5	5
CNIDARIA	Hydra sp.	8	3

APPENDIX B:

1999 Clark Fork Basin macroinvertebrate data

B.1 MACROINVERTEBRATE DATA

BLACKTAIL CREEK above Grove Gulch - STATION SF-1 - 16 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						20%	241	
Optioservus spp.	67	67	135	93	362	8%	90.5	32.1
Zaitzevia sp.	40	36	64	19	159	3%	39.8	18.6
Cleptelmis ornata	198	30	46	161	435	9%	108.8	83.3
Narpus concolor	0	0	1	0	1	0%	0.3	0.5
Brychius sp.	1	1	0	4	6	0%	1.5	1.7
DIPTERA						49%	571	
Pagastia sp	93	31	79	53	256	5%	64.0	27.5
Brillia sp.	0	1	3	0	4	0%	1.0	1.4
Cardiocladius spp.	50	10	19	10	89	2%	22.3	19.0
Cricotopus spp.	13	5	11	5	34	1%	8.5	4.1
Eukiefferiella spp.	7	3	6	10	26	1%	6.5	2.9
Nanocladius sp.	1	0	0	0	1	0%	0.3	0.5
Orthocladius spp.	16	1	5	47	69	1%	17.3	20.8
Parametriocnemus sp.	1	2	10	9	22	0%	5.5	4.7
Rheotanytarsus sp.	2	1	2	0	5	0%	1.3	1.0
Tanytarsus sp.	0	2	0	0	2	0%	0.5	1.0
Micropsectra spp.	1	2	5	6	14	0%	3.5	2.4
Dicranota sp.	16	0	1	2	19	0%	4.8	7.5
Hexatoma sp.	1	8	12	3	24	1%	6.0	5.0
Tipula sp.	0	0	5	1	6	0%	1.5	2.4
Simulium spp.	579	157	675	291	1702	36%	425.5	242.2
Limnophora sp.	1	0	2	3	6	0%	1.5	1.3
Pericoma sp.	6	0	0	0	6	0%	1.5	3.0
EPHEMEROPTERA						6%	71	
Baetis tricaudatus	88	53	73	29	243	5%	60.8	25.6
Baetis punctiventris	1	0	0	0	1	0%	0.3	0.5
Diphetor hageni	0	1	0	1	2	0%	0.5	0.6
Nixe sp.	20	13	4	2	39	1%	9.8	8.3
PLECOPTERA						7%	84	
Malenka sp.	1	0	0	0	1	0%	0.3	0.5
Skwala sp.	0	4	3	0	7	0%	1.8	2.1
Isoperla sp.	0	0	1	1	2	0%	0.5	0.6
Pteronarcella badia	72	38	104	84	298	6%	74.5	27.7
Chloroperlinae	3	10	11	3	27	1%	6.8	4.3

B.1   M A C R O I N V E R T E B R A T E   D A T A

BLACKTAIL CREEK above Grove Gulch - STATION SF-1 - 16 AUG 99

.

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TRICHOPTERA						17%	195	
Arctopsyche grandis	0	0	1	1	2	0%	0.5	0.6
Cheumatopsyche spp.	5	0	5	10	20	0%	5.0	4.1
Hydropsyche oslari ?	145	88	273	96	602	13%	150.5	85.5
Hydropsyche slossonae	16	18	23	11	68	1%	17.0	5.0
Hydroptila spp.	31	4	15	7	57	1%	14.3	12.1
Lepidostoma sp.	6	1	0	2	9	0%	2.3	2.6
Brachycentrus occidentalis	0	2	0	0	2	0%	0.5	1.0
Glossosoma sp.	0	0	20	0	20	0%	5.0	10.0
ANNELIDA						1%	14	
Lumbricidae	2	1	0	1	4	0%	1.0	0.8
Naididae	5	19	10	10	44	1%	11.0	5.8
Tubificidae	0	1	5	0	6	0%	1.5	2.4
MOLLUSCA						0%	0	
Sphaeriidae	1	0	0	0	1	0%	0.3	0.5
ID's by D. McGuire								
TOTAL ORGANISMS	1489	610	1629	975	4703		1176	470
TAXA RICHNESS	32	30	32	30	43		31.0	1.2
SHAN. DIVERSITY	3.19	3.61	3.06	3.37	3.36		3.30	0.24
BIOTIC INDEX	4.61	4.40	4.57	4.57	4.56		4.54	0.09
EPT RICHNESS	11	11	12	12	17		11.5	0.6
% R.A. DOMINANT	39%	26%	41%	30%	36%		34%	7.4%
% R.A. FILTERERS	50%	44%	60%	42%	51%		49%	8%
METALS TOLERANCE	5.60	5.38	5.65	5.35	5.54		5.50	0.15
Baetidae/Ephemeroptera	0.82	0.81	0.95	0.94	0.86		0.88	0.08
Hydropsychinae/Trichoptera	0.82	0.94	0.89	0.92	0.88		0.89	0.05
EPT / (EPT + CHIR.)	0.68	0.80	0.79	0.64	0.73		0.73	0.08

SILVER BOW CREEK above Butte WWTP - STATION 00 - 16 AUG 99

.

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						2%	11	
Optioservus spp.	8	2	2	7	19	1%	4.8	3.2
Zaitzevia sp.	0	1	0	0	1	0%	0.3	0.5
Cleptelmis ornata	0	0	0	1	1	0%	0.3	0.5
Agabus sp.	0	0	2	7	9	0%	2.3	3.3
Agabinus sp.	0	0	1	0	1	0%	0.3	0.5
Deronectes sp.	12	1	0	0	13	0%	3.3	5.9
DIPTERA						88%	597	
Macropelopia sp.	0	1	1	0	2	0%	0.5	0.6
Odontomesa sp.	0	1	0	0	1	0%	0.3	0.5
Pagastia sp	34	13	4	20	71	3%	17.8	12.7
Cardiocladius spp.	8	65	1	30	104	4%	26.0	28.8
Cricotopus spp.	565	446	446	270	1727	63%	431.8	121.6
Eukiefferiella spp.	0	13	4	5	22	1%	5.5	5.4
Orthocladius spp.	0	1	2	0	3	0%	0.8	1.0
Parametriocnemus sp.	0	2	0	2	4	0%	1.0	1.2
Dicranota sp.	12	0	11	10	33	1%	8.3	5.6
Simulium (Psilozoa)	14	52	13	300	379	14%	94.8	138.0
Limnophora sp.	5	22	5	11	43	2%	10.8	8.0
EPHEMEROPTERA						0%	3	
Baetis tricaudatus	1	6	2	3	12	0%	3.0	2.2
PLECOPTERA						0%	0	
Skwala sp.	1	0	0	0	1	0%	0.3	0.5
TRICHOPTERA						10%	68	
Arctopsyche grandis	0	0	0	1	1	0%	0.3	0.5
Cheumatopsyche spp.	1	2	0	0	3	0%	0.8	1.0
Hydropsyche occidentalis	0	2	1	0	3	0%	0.8	1.0
Hydropsyche oslari ?	78	60	2	95	235	9%	58.8	40.4
Hydropsyche slossonae	4	7	0	6	17	1%	4.3	3.1
Brachycentrus occidentalis	7	3	0	4	14	1%	3.5	2.9
ANNELIDA						0%	2	
Tubificidae	2	1	6	0	9	0%	2.3	2.6
ID's by D. McGuire								

B.2 MACROINVERTEBRATE DATA								
SILVER BOW CREEK above Butte WWTP - STATION 00 - 16 AUG 99								
.								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TOTAL ORGANISMS	752	701	503	772	2728		682	123
TAXA RICHNESS	15	20	16	16	26		16.8	2.2
SHAN. DIVERSITY	1.50	2.02	0.89	2.26	2.00		1.67	0.61
BIOTIC INDEX	6.09	6.24	6.82	6.09	6.26		6.31	0.35
EPT RICHNESS	6	6	3	5	8		5.0	1.4
% R.A. DOMINANT	75%	64%	89%	39%	63%		67%	21%
% R.A. FILTERERS	14%	18%	3%	53%	24%		22%	21%
METALS TOLERANCE	9.12	9.00	9.56	7.94	8.84		8.90	0.68
Baetidae/Ephemeroptera	1.00	1.00	1.00	1.00	1.00		1.00	0.00
Hydropsychinae/Trichoptera	0.92	0.96	1.00	0.95	0.95		0.96	0.03
EPT / (EPT + CHIR.)	0.13	0.13	0.01	0.25	0.13		0.13	0.10

B.3 MACROINVERTEBRATE DATA

SILVER BOW CREEK below Colorado Tailings - STATION 01 - 16 AUG 99

.

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						0%	5	
Optioservus spp.	0	3	1	3	7	0%	1.8	1.5
Agabinus sp.	6	0	0	0	6	0%	1.5	3.0
Deronectes sp.	5	0	0	0	5	0%	1.3	2.5
DIPTERA						76%	1096	
Macropelopia sp.	133	1	4	3	141	2%	35.3	65.2
Thienemannimyia gp.	172	12	11	1	196	3%	49.0	82.2
Cardiocladius spp.	6	0	5	1	12	0%	3.0	2.9
Cricotopus spp.	600	99	94	12	805	14%	201.3	268.8
Eukiefferiella spp.	80	21	22	1	124	2%	31.0	34.1
Nanocladius sp.	36	0	0	0	36	1%	9.0	18.0
Orthocladius spp.	11	0	0	0	11	0%	2.8	5.5
Parametriocnemus sp.	15	0	0	0	15	0%	3.8	7.5
Chironomus sp.	10	2	1	0	13	0%	3.3	4.6
Cryptochironomus sp.	5	0	0	1	6	0%	1.5	2.4
Phaenopsectra sp	227	5	6	14	252	4%	63.0	109.4
Tanytarsus sp.	0	1	0	0	1	0%	0.3	0.5
Simulium (Psilozoa)	2193	140	340	88	2761	48%	690.3	1008
Limnophora sp.	10	1	0	0	11	0%	2.8	4.9
TRICHOPTERA						0%	0	
Hydropsyche oslari ?	0	1	0	0	1	0%	0.3	0.5
ANNELIDA						23%	332	
Tubificidae	61	389	17	861	1328	23%	332.0	389.8
ID's by D. McGuire								
TOTAL ORGANISMS	3570	675	501	985	5731		1433	1439
TAXA RICHNESS	16	12	10	10	19		12.0	2.8
SHAN. DIVERSITY	1.96	1.76	1.55	0.74	2.20		1.50	0.54
BIOTIC INDEX	6.89	8.71	7.08	9.61	7.59		8.07	1.31
EPT RICHNESS	0	1	0	0	1		0.3	0.5
% R.A. DOMINANT	61%	58%	68%	87%	48%		69%	13%
% R.A. FILTERERS	61%	21%	68%	9%	48%		40%	29%
METALS TOLERANCE	7.02	6.81	7.49	6.11	6.88		6.86	0.58
Baetidae/Ephemeroptera	1.00	1.00	1.00	1.00	1.00		1.00	0.00
Hydropsychinae/Trichoptera	1.00	1.00	1.00	1.00	1.00		1.00	0.00
EPT / (EPT + CHIR.)	0.00	0.01	0.00	0.00	0.00		0.00	0.01

B.4	MACROINVERTEBRATE DATA							
SILVER BOW CREEK at Opportunity - STATION 02.5 - 15 AUG 99								
.								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						3%	3	
Optioservus spp.	0	2	2	7	11	2%	2.8	3.0
Oreodytes spp.	0	0	0	1	1	0%	0.3	0.5
DIPTERA						53%	60	
Macropelopia sp.	0	1	0	1	2	0%	0.5	0.6
Pagastia sp	13	22	5	51	91	20%	22.8	20.1
Cardiocladius spp.	13	15	16	68	112	24%	28.0	26.7
Cricotopus spp.	12	2	3	9	26	6%	6.5	4.8
Eukiefferiella spp.	0	1	1	1	3	1%	0.8	0.5
Cryptochironomus sp.	0	0	1	0	1	0%	0.3	0.5
Polypedilum spp.	0	0	0	1	1	0%	0.3	0.5
Antocha sp.	1	0	0	0	1	0%	0.3	0.5
Ormosia sp.?	0	0	0	1	1	0%	0.3	0.5
Simulium (Psilozoa)	0	0	1	2	3	1%	0.8	1.0
TRICHOPTERA						45%	51	
Hydropsyche cockerelli	0	2	0	0	2	0%	0.5	1.0
Hydropsyche nr. morosa	0	0	0	2	2	0%	0.5	1.0
Hydropsyche oslari ?	15	15	8	66	104	23%	26.0	26.9
Brachycentrus americanus	11	58	7	19	95	21%	23.8	23.4
Helicopsyche borealis	0	1	0	1	2	0%	0.5	0.6
ID's by D. McGuire								
TOTAL ORGANISMS	65	119	44	230	458		115	83
TAXA RICHNESS	6	10	9	14	17		9.8	3.3
SHAN. DIVERSITY	2.39	2.18	2.60	2.48	2.61		2.41	0.18
BIOTIC INDEX	3.40	2.09	3.86	3.32	3.07		3.17	0.76
EPT RICHNESS	2	4	2	4	5		3.0	1.2
% R.A. DOMINANT	23%	49%	36%	30%	24%		34%	11%
% R.A. FILTERERS	40%	63%	36%	39%	45%		45%	12%
METALS TOLERANCE	7.57	5.97	7.43	7.51	7.11		7.12	0.77
Baetidae/Ephemeroptera	1.00	1.00	1.00	1.00	1.00		1.00	0.00
Hydropsychinae/Trichoptera	0.58	0.22	0.53	0.77	0.53		0.53	0.23
EPT / (EPT + CHIR.)	0.41	0.65	0.37	0.40	0.46		0.46	0.13

B.5   M A C R O I N V E R T E B R A T E   D A T A

SILVER BOW CREEK below WSP - STATION 04.5 - 15 AUG 99

.

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						6%	124	
Optioservus spp.	39	14	202	226	481	6%	120.3	109.2
Zaitzevia sp.	0	0	1	11	12	0%	3.0	5.4
Cleptelmis ornata	0	0	0	1	1	0%	0.3	0.5
DIPTERA						22%	459	
Thienemannimyia gp.	0	1	1	10	12	0%	3.0	4.7
Pagastia sp	16	3	23	71	113	1%	28.3	29.7
Potthastia sp.	2	0	6	1	9	0%	2.3	2.6
Cardiocladius spp.	0	5	0	0	5	0%	1.3	2.5
Cricotopus spp.	150	60	98	110	418	5%	104.5	37.1
Cricotopus nostococladius	0	0	0	1	1	0%	0.3	0.5
Eukiefferiella spp.	1	0	5	13	19	0%	4.8	5.9
Orthocladius spp.	22	40	43	15	120	1%	30.0	13.6
Parametriocnemus sp.	29	8	38	44	119	1%	29.8	15.8
Tvetenia sp.	129	60	281	221	691	8%	172.8	97.8
Glyptotendipes sp.	0	0	1	2	3	0%	0.8	1.0
Microtendipes sp	19	0	26	25	70	1%	17.5	12.1
Polypedilum spp.	7	2	19	27	55	1%	13.8	11.4
Rheotanytarsus sp.	1	1	6	5	13	0%	3.3	2.6
Tanytarsus sp.	0	0	0	1	1	0%	0.3	0.5
Micropsectra spp.	0	6	0	2	8	0%	2.0	2.8
Antocha sp.	0	0	1	10	11	0%	2.8	4.9
Hexatoma sp.	6	0	1	4	11	0%	2.8	2.8
Tipula sp.	0	0	1	0	1	0%	0.3	0.5
Simulium spp.	44	54	53	2	153	2%	38.3	24.6
Limnophora sp.	1	1	0	0	2	0%	0.5	0.6
EPHEMEROPTERA						21%	425	
Baetis tricaudatus	136	67	53	89	345	4%	86.3	36.3
Diphetor hageni	0	0	0	2	2	0%	0.5	1.0
Attenella margarita	2	1	5	7	15	0%	3.8	2.8
Ephemerella inermis	0	1	0	0	1	0%	0.3	0.5
Nixe sp.	0	0	0	2	2	0%	0.5	1.0
Paraleptophlebia sp.	0	0	1	5	6	0%	1.5	2.4
Tricorythodes minutus	223	187	486	433	1329	16%	332.3	149.2
LEPIDOPTERA								
Petrophila sp.	0	1	0	1	2	0%	0.5	0.6
ODONATA								
Ophiogomphus sp.	0	0	0	2	2	0%	0.5	1.0

B.5	MACROINVERTEBRATE DATA							
SILVER BOW CREEK below WSP - STATION 04.5 - 15 AUG 99								
.								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
PLECOPTERA						0%	1	
Skwala sp.	4	0	0	0	4	0%	1.0	2.0
Isoperla sp.	0	0	0	1	1	0%	0.3	0.5
TRICHOPTERA						27%	563	
Cheumatopsyche spp.	60	12	158	178	408	5%	102.0	79.1
Hydropsyche occidentalis	328	106	590	404	1428	17%	357.0	200.3
Hydropsyche cockerelli	56	6	32	0	94	1%	23.5	25.7
Hydropsyche nr. morosa	11	0	22	21	54	1%	13.5	10.3
Hydroptila spp.	12	0	16	97	125	2%	31.3	44.4
Ochrotrichia sp.	12	11	11	32	66	1%	16.5	10.3
Lepidostoma sp.	6	0	0	0	6	0%	1.5	3.0
Brachycentrus occidentalis	12	6	25	25	68	1%	17.0	9.6
Glossosomatidae	0	1	1	1	3	0%	0.8	0.5
ANNELIDA						1%	22	
Naididae	1	2	16	30	49	1%	12.3	13.7
Tubificidae	0	0	10	30	40	0%	10.0	14.1
CRUSTACEA								
Hyalella azteca	276	118	921	340	1655	20%	413.8	350.8
Gammarus sp.	7	2	44	37	90	1%	22.5	21.1
Caecidotea sp.	0	1	1	6	8	0%	2.0	2.7
MOLLUSCA						1%	19	
Physella sp.	28	6	21	3	58	1%	14.5	12.0
Gyraulus sp.	2	0	10	7	19	0%	4.8	4.6
OTHER								
Turbellaria	5	0	8	38	51	1%	12.8	17.2
ID's by D. McGuire								
TOTAL ORGANISMS	1647	783	3237	2593	8260		2065	1076
TAXA RICHNESS	32	29	38	45	52		36.0	7.1
SHAN. DIVERSITY	3.66	3.46	3.37	3.93	3.75		3.60	0.25
BIOTIC INDEX	5.44	5.36	5.77	5.26	5.51		5.46	0.22
EPT RICHNESS	12	10	12	14	18		12.0	1.6
% R.A. DOMINANT	20%	24%	28%	17%	20%		22%	5.1%
% R.A. FILTERERS	31%	24%	27%	24%	27%		27%	3%
METALS TOLERANCE	4.79	4.69	4.24	4.59	4.50		4.58	0.24
Baetidae/Ephemeroptera	0.38	0.26	0.10	0.17	0.20		0.23	0.12
Hydropsychinae/Trichoptera	0.92	0.87	0.94	0.80	0.88		0.88	0.06
EPT / (EPT + CHIR.)	0.70	0.68	0.72	0.70	0.70		0.70	0.02

B.6 MACROINVERTEBRATE DATA
MILL/WILLOW CREEKS Bypass - STATION 05.5 (MW-2) - 15 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						26%	197	
Optioservus spp.	275	98	190	157	720	24%	180.0	73.9
Zaitzevia sp.	5	19	30	8	62	2%	15.5	11.4
Cleptelmis ornata	2	0	2	0	4	0%	1.0	1.2
Oreodytes spp.	1	0	0	0	1	0%	0.3	0.5
DIPTERA						15%	112	
Thienemannimyia gp.	6	1	0	0	7	0%	1.8	2.9
Pagastia sp	4	5	5	4	18	1%	4.5	0.6
Cardiocladius spp.	0	0	0	1	1	0%	0.3	0.5
Cricotopus spp.	17	1	11	3	32	1%	8.0	7.4
Cricotopus nostococladius	2	0	2	15	19	1%	4.8	6.9
Eukiefferiella spp.	2	0	1	0	3	0%	0.8	1.0
Orthocladius spp.	22	5	11	4	42	1%	10.5	8.3
Paraphaenocladius sp.	0	0	0	1	1	0%	0.3	0.5
Tvetenia sp.	34	102	66	18	220	7%	55.0	37.1
Microtendipes sp	5	0	0	4	9	0%	2.3	2.6
Polypedilum spp.	0	2	0	1	3	0%	0.8	1.0
Rheotanytarsus sp.	3	1	1	0	5	0%	1.3	1.3
Tanytarsus sp.	0	0	0	1	1	0%	0.3	0.5
Micropsectra spp.	3	9	8	5	25	1%	6.3	2.8
Antocha sp.	1	2	1	0	4	0%	1.0	0.8
Hexatoma sp.	8	1	8	9	26	1%	6.5	3.7
Simulium spp.	5	10	18	0	33	1%	8.3	7.7
EPHEMEROPTERA						10%	78	
Acentrella insignificans	1	0	7	0	8	0%	2.0	3.4
Baetis tricaudatus	26	28	37	3	94	3%	23.5	14.5
Baetis punctiventris	1	0	0	0	1	0%	0.3	0.5
Diphetor hageni	5	2	2	0	9	0%	2.3	2.1
Attenella margarita	11	1	5	2	19	1%	4.8	4.5
Serratella tibialis	0	1	0	1	2	0%	0.5	0.6
Ephemerella inermis	1	0	1	1	3	0%	0.8	0.5
Drunella grandis	1	2	1	0	4	0%	1.0	0.8
Nixe sp.	31	15	18	22	86	3%	21.5	7.0
Paraleptophlebia sp.	3	9	3	4	19	1%	4.8	2.9
Tricorythodes minutus	34	12	10	10	66	2%	16.5	11.7

MILL/WILLOW CREEKS Bypass - STATION 05.5 (MW-2) - 15 AUG 99

.

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
PLECOPTERA						2%	13	
Hesperoperla pacifica	0	1	0	0	1	0%	0.3	0.5
Malenka sp.	0	1	0	0	1	0%	0.3	0.5
Skwala sp.	2	5	10	2	19	1%	4.8	3.8
Isoperla sp.	1	0	0	0	1	0%	0.3	0.5
Pteronarcella badia	7	16	7	1	31	1%	7.8	6.2
TRICHOPTERA						47%	361	
Arctopsyche grandis	0	3	6	5	14	0%	3.5	2.6
Cheumatopsyche spp.	0	0	1	1	2	0%	0.5	0.6
Hydropsyche occidentalis	10	77	71	27	185	6%	46.3	32.9
Hydropsyche cockerelli	8	20	20	13	61	2%	15.3	5.9
Hydropsyche nr. morosa	2	0	0	0	2	0%	0.5	1.0
Hydropsyche oslari ?	7	17	4	2	30	1%	7.5	6.7
Hydropsyche slossonae	0	1	2	0	3	0%	0.8	1.0
Wormaldia sp.	6	13	3	2	24	1%	6.0	5.0
Amiocentrus aspilus	1	0	1	0	2	0%	0.5	0.6
Brachycentrus americanus	0	1	0	0	1	0%	0.3	0.5
Brachycentrus occidentalis	5	12	8	3	28	1%	7.0	3.9
Helicopsyche borealis	228	134	312	228	902	30%	225.5	72.7
Agepetus sp.	17	9	19	24	69	2%	17.3	6.2
Protoptila sp.	0	0	2	0	2	0%	0.5	1.0
Glossosoma sp.	40	21	38	20	119	4%	29.8	10.7
MOLLUSCA						0%	1	
Physella sp.	2	0	1	0	3	0%	0.8	1.0
ID's by D. McGuire								
TOTAL ORGANISMS	845	657	943	602	3047		762	159
TAXA RICHNESS	41	36	39	33	53		37.3	3.5
SHAN. DIVERSITY	3.37	3.81	3.48	3.09	3.60		3.44	0.30
BIOTIC INDEX	3.91	3.82	3.77	3.64	3.79		3.79	0.11
EPT RICHNESS	23	23	24	19	31		22.3	2.2
% R.A. DOMINANT	33%	20%	33%	38%	30%		31%	7.4%
% R.A. FILTERERS	5%	24%	14%	9%	13%		13%	8%
METALS TOLERANCE	4.16	4.08	4.18	4.00	4.12		4.10	0.08
Baetidae/Ephemeroptera	0.29	0.43	0.55	0.07	0.36		0.33	0.21
Hydropsychinae/Trichoptera	0.08	0.37	0.20	0.13	0.20		0.20	0.13
EPT / (EPT + CHIR.)	0.82	0.76	0.85	0.87	0.82		0.82	0.05

B.7 MACROINVERTEBRATE DATA
WARM SPRINGS CREEK near mouth - STATION 06 - 15 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						13%	72	
Optioservus spp.	44	140	56	31	271	12%	67.8	49.2
Zaitzevia sp.	2	2	2	0	6	0%	1.5	1.0
Cleptelmis ornata	3	5	1	2	11	0%	2.8	1.7
Oreodytes spp.	0	0	0	1	1	0%	0.3	0.5
DIPTERA						47%	268	
Thienemannimyia gp.	0	0	0	1	1	0%	0.3	0.5
Pagastia sp	16	39	5	18	78	3%	19.5	14.2
Brillia sp.	0	0	2	0	2	0%	0.5	1.0
Cardiocladius spp.	0	0	8	0	8	0%	2.0	4.0
Cricotopus spp.	34	14	6	2	56	2%	14.0	14.2
Cricotopus nostococladius	0	1	0	4	5	0%	1.3	1.9
Eukiefferiella spp.	2	6	13	10	31	1%	7.8	4.8
Orthocladius spp.	11	7	7	4	29	1%	7.3	2.9
Parametriocnemus sp.	4	3	0	0	7	0%	1.8	2.1
Tvetenia sp.	18	21	26	29	94	4%	23.5	4.9
Polypedilum spp.	0	0	0	1	1	0%	0.3	0.5
Rheotanytarsus sp.	4	17	5	18	44	2%	11.0	7.5
Micropsectra spp.	107	83	52	62	304	13%	76.0	24.4
Antocha sp.	1	0	0	4	5	0%	1.3	1.9
Simulium spp.	6	9	325	58	398	18%	99.5	152.2
Chelifera sp.	1	6	1	0	8	0%	2.0	2.7
EPHEMEROPTERA						18%	101	
Acentrella insignificans	26	35	46	39	146	6%	36.5	8.3
Baetis tricaudatus	31	26	71	37	165	7%	41.3	20.3
Diphetor hageni	4	4	1	0	9	0%	2.3	2.1
Attenella margarita	1	0	0	0	1	0%	0.3	0.5
Serratella tibialis	0	2	1	4	7	0%	1.8	1.7
Drunella doddsi	1	0	0	0	1	0%	0.3	0.5
Drunella grandis	6	19	7	13	45	2%	11.3	6.0
Epeorus longimanus	0	0	6	1	7	0%	1.8	2.9
Nixe sp.	4	4	1	3	12	1%	3.0	1.4
Paraleptophlebia sp.	1	0	0	0	1	0%	0.3	0.5
Tricorythodes minutus	6	1	0	1	8	0%	2.0	2.7

B.7   M A C R O I N V E R T E B R A T E   D A T A

WARM SPRINGS CREEK near mouth - STATION 06 - 15 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
PLECOPTERA						3%	18	
Hesperoperla pacifica	1	3	5	1	10	0%	2.5	1.9
Malenka sp.	2	3	0	1	6	0%	1.5	1.3
Zapada cinctipes	0	1	0	0	1	0%	0.3	0.5
Skwala sp.	4	0	5	4	13	1%	3.3	2.2
Pteronarcella badia	5	8	9	7	29	1%	7.3	1.7
Chloroperlinae	6	2	3	0	11	0%	2.8	2.5
TRICHOPTERA						19%	107	
Arctopsyche grandis	5	12	19	25	61	3%	15.3	8.7
Hydropsyche occidentalis	6	19	36	89	150	7%	37.5	36.5
Hydropsyche (C) cockerelli	3	3	2	0	8	0%	2.0	1.4
Neophylax sp.	0	1	1	1	3	0%	0.8	0.5
Hydroptila spp.	2	1	0	7	10	0%	2.5	3.1
Wormaldia sp.	1	2	2	0	5	0%	1.3	1.0
Psychomyia flavida	0	0	0	1	1	0%	0.3	0.5
Brachycentrus americanus	1	17	11	44	73	3%	18.3	18.4
Brachycentrus occidentalis	2	17	35	21	75	3%	18.8	13.6
Micrasema sp.	0	1	0	1	2	0%	0.5	0.6
Rhyacophila brunnea gp.	1	3	0	2	6	0%	1.5	1.3
Helicopsyche borealis	0	1	0	1	2	0%	0.5	0.6
Agapetus sp.	7	11	4	6	28	1%	7.0	2.9
Protoptila sp.	0	3	1	0	4	0%	1.0	1.4
Glossosoma sp.	0	0	1	0	1	0%	0.3	0.5
ANNELIDA						0%	1	
Enchytrieadae	1	0	0	0	1	0%	0.3	0.5
Naididae	0	0	0	1	1	0%	0.3	0.5
ID's by D. McGuire								
TOTAL ORGANISMS	380	552	776	555	2263		566	162
TAXA RICHNESS	38	39	35	38	54		37.5	1.7
SHAN. DIVERSITY	3.92	4.04	3.33	4.14	4.17		3.85	0.36
BIOTIC INDEX	4.22	3.94	4.79	4.03	4.30		4.24	0.38
EPT RICHNESS	23	25	21	22	32		22.8	1.7
% R.A. DOMINANT	28%	25%	42%	16%	18%		28%	11%
% R.A. FILTERERS	7%	17%	56%	46%	36%		32%	23%
METALS TOLERANCE	3.88	4.07	4.82	4.03	4.28		4.20	0.42
Baetidae/Ephemeroptera	0.76	0.71	0.89	0.78	0.80		0.78	0.07
Hydropsychinae/Trichoptera	0.32	0.24	0.34	0.45	0.37		0.34	0.09
EPT / (EPT + CHIR.)	0.39	0.51	0.68	0.67	0.58		0.56	0.14

B.8 M A C R O I N V E R T E B R A T E   D A T A

CLARK FORK RIVER below Warm Springs Ck. - STATION 07 - 15 AUG 99

.

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						20%	298	
Optioservus spp.	100	347	265	242	954	16%	238.5	103
Zaitzevia sp.	8	58	42	22	130	2%	32.5	22.0
Cleptelmis ornata	12	38	34	24	108	2%	27.0	11.6
DIPTERA						28%	420	
Thienemannimyia gp.	0	22	1	7	30	1%	7.5	10.1
Pentaneura sp.	0	6	0	0	6	0%	1.5	3.0
Pagastia sp	76	132	149	96	453	8%	113.3	33.2
Prodiamesa sp.	0	0	0	1	1	0%	0.3	0.5
Cricotopus spp.	67	67	64	19	217	4%	54.3	23.5
Cricotopus nostococladius	0	1	2	0	3	0%	0.8	1.0
Eukiefferiella spp.	34	33	16	16	99	2%	24.8	10.1
Nanocladius sp.	1	0	0	0	1	0%	0.3	0.5
Orthocladius spp.	12	13	10	5	40	1%	10.0	3.6
Parametriocnemus sp.	7	36	21	49	113	2%	28.3	18.2
Rheocricotopus sp.	1	0	0	0	1	0%	0.3	0.5
Tvetenia sp.	37	107	36	144	324	5%	81.0	53.6
Cryptochironomus sp.	1	0	0	0	1	0%	0.3	0.5
Glyptotendipes sp.	0	1	0	0	1	0%	0.3	0.5
Microtendipes sp	1	33	23	43	100	2%	25.0	18.0
Phaenopsectra sp	0	0	0	6	6	0%	1.5	3.0
Polypedilum spp.	7	6	7	5	25	0%	6.3	1.0
Rheotanytarsus sp.	2	5	0	6	13	0%	3.3	2.8
Tanytarsus sp.	0	0	1	0	1	0%	0.3	0.5
Micropsectra spp.	5	43	23	50	121	2%	30.3	20.4
Antocha sp.	16	28	14	17	75	1%	18.8	6.3
Dicranota sp.	0	0	1	0	1	0%	0.3	0.5
Hexatoma sp.	1	1	2	0	4	0%	1.0	0.8
Tipula sp.	1	2	1	5	9	0%	2.3	1.9
Atherix pachypus	0	0	0	5	5	0%	1.3	2.5
Simulium spp.	3	16	0	11	30	1%	7.5	7.3

B.8   M A C R O I N V E R T E B R A T E   D A T A

CLARK FORK RIVER below Warm Springs Ck. - STATION 07 - 15 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
EPHEMEROPTERA						21%	316	
Acentrella insignificans	2	7	10	0	19	0%	4.8	4.6
Baetis tricaudatus	28	27	48	47	150	3%	37.5	11.6
Baetis punctiventris	0	0	6	0	6	0%	1.5	3.0
Callibaetis sp.	1	0	0	0	1	0%	0.3	0.5
Diphetor hageni	1	0	1	0	2	0%	0.5	0.6
Attenella margarita	8	22	7	21	58	1%	14.5	8.1
Drunella grandis	8	19	12	8	47	1%	11.8	5.2
Nixe sp.	6	1	8	0	15	0%	3.8	3.9
Paraleptophlebia sp.	4	3	20	14	41	1%	10.3	8.2
Tricorythodes minutus	126	303	299	198	926	16%	231.5	85.5
MEGALOPTERA								
Sialis sp.	0	0	1	2	3	0%	0.8	1.0
ODONATA								
Ophiogomphus sp.	0	1	0	2	3	0%	0.8	1.0
PLECOPTERA						2%	29	
Hesperoperla pacifica	2	2	3	3	10	0%	2.5	0.6
Malenka sp.	1	5	1	8	15	0%	3.8	3.4
Skwala sp.	2	0	3	2	7	0%	1.8	1.3
Isoperla sp.	0	0	0	2	2	0%	0.5	1.0
Pteronarcella badia	5	21	9	46	81	1%	20.3	18.5
TRICHOPTERA						24%	355	
Cheumatopsyche spp.	0	6	0	16	22	0%	5.5	7.5
Hydropsyche occidentalis	15	303	152	382	852	14%	213.0	163
Hydropsyche (C) cockerelli	1	23	2	18	44	1%	11.0	11.2
Hydropsyche (C) oslari ?	0	1	0	0	1	0%	0.3	0.5
Limnephilus sp.	0	2	0	0	2	0%	0.5	1.0
Hydroptila spp.	65	63	31	39	198	3%	49.5	17.1
Ochrotrichia sp.	16	39	8	11	74	1%	18.5	14.1
Lepidostoma sp.	0	1	2	0	3	0%	0.8	1.0
Oecetis sp.	3	10	7	17	37	1%	9.3	5.9
Brachycentrus occidentalis	6	54	28	30	118	2%	29.5	19.6
Rhyacophila brunnea gp.	2	32	4	22	60	1%	15.0	14.5
Helicopsyche borealis	1	5	1	0	7	0%	1.8	2.2
Glossosoma sp.	1	0	0	0	1	0%	0.3	0.5

B.8   M A C R O I N V E R T E B R A T E   D A T A

CLARK FORK RIVER below Warm Springs Ck. - STATION 07 - 15 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
ANNELIDA						3%	39	
Naididae	2	6	0	13	21	0%	5.3	5.7
Tubificidae	15	46	18	55	134	2%	33.5	20.0
Helobdella stagnalis	1	0	0	0	1	0%	0.3	0.5
CRUSTACEA								
Hyalella azteca	19	16	36	27	98	2%	24.5	9.0
Gammarus sp.	0	0	1	7	8	0%	2.0	3.4
Caecidotea sp.	1	0	0	0	1	0%	0.3	0.5
MOLLUSCA						1%	8	
Physella sp.	1	10	0	0	11	0%	2.8	4.9
Gyraulus sp.	2	10	5	1	18	0%	4.5	4.0
Sphaeriidae	0	0	0	2	2	0%	0.5	1.0
ID's by D. McGuire								
TOTAL ORGANISMS	737	2033	1435	1766	5971		1493	560
TAXA RICHNESS	49	49	46	46	68		47.5	1.7
SHAN. DIVERSITY	4.20	4.24	3.97	4.19	4.29		4.15	0.12
BIOTIC INDEX	4.78	4.60	4.38	4.67	4.59		4.61	0.17
EPT RICHNESS	22	22	22	18	28		21.0	2.0
% R.A. DOMINANT	17%	17%	21%	22%	16%		19%	2.4%
% R.A. FILTERERS	4%	20%	13%	26%	18%		16%	10%
METALS TOLERANCE	5.34	4.78	5.00	4.59	4.84		4.93	0.32
Baetidae/Ephemeroptera	0.17	0.09	0.16	0.16	0.14		0.15	0.04
Hydropsychinae/Trichoptera	0.15	0.62	0.66	0.78	0.65		0.55	0.28
EPT / (EPT + CHIR.)	0.55	0.65	0.65	0.66	0.64		0.63	0.05

B.9 MACROINVERTEBRATE DATA
CLARK FORK RIVER near Dempsey - STATION 08 - 14 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						15%	294	
Optioservus spp.	156	143	210	167	676	9%	169.0	29.0
Zaitzevia sp.	136	174	81	92	483	6%	120.8	42.7
Cleptelmis ornata	6	11	0	0	17	0%	4.3	5.3
DIPTERA						32%	637	
Thienemannimyia gp.	1	5	0	3	9	0%	2.3	2.2
Nilotanypus sp.	0	5	0	0	5	0%	1.3	2.5
Pagastia sp	22	53	3	5	83	1%	20.8	23.1
Cardiocladius spp.	0	1	0	2	3	0%	0.8	1.0
Cricotopus spp.	14	16	84	27	141	2%	35.3	33.0
Eukiefferiella spp.	6	2	21	20	49	1%	12.3	9.7
Orthocladius spp.	35	16	11	29	91	1%	22.8	11.1
Parametriocnemus sp.	22	24	10	52	108	1%	27.0	17.8
Tvetenia sp.	152	173	211	87	623	8%	155.8	51.9
Glyptotendipes sp.	0	0	1	0	1	0%	0.3	0.5
Microtendipes sp	1	0	2	0	3	0%	0.8	1.0
Polypedilum spp.	30	33	25	24	112	1%	28.0	4.2
Micropsectra spp.	5	7	0	0	12	0%	3.0	3.6
Antocha sp.	5	1	0	0	6	0%	1.5	2.4
Hexatoma sp.	4	3	4	1	12	0%	3.0	1.4
Tipula sp.	3	4	11	2	20	0%	5.0	4.1
Simulium spp.	285	322	472	190	1269	16%	317.3	117.2
Chelifera sp.	2	0	0	0	2	0%	0.5	1.0
EPHEMEROPTERA						21%	406	
Acentrella insignificans	0	0	0	2	2	0%	0.5	1.0
Baetis tricaudatus	55	60	39	55	209	3%	52.3	9.1
Baetis punctiventris	0	26	5	4	35	0%	8.8	11.7
Attenella margarita	46	91	126	43	306	4%	76.5	39.6
Ephemerella inermis	5	0	0	0	5	0%	1.3	2.5
Paraleptophlebia sp.	0	0	1	0	1	0%	0.3	0.5
Tricorythodes minutus	166	165	630	103	1064	13%	266.0	244.4
ODONATA								
Ophiogomphus sp.	0	0	1	0	1	0%	0.3	0.5

B.9 MACROINVERTEBRATE DATA

CLARK FORK RIVER near Dempsey - STATION 08 - 14 AUG 99

.

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
PLECOPTERA						2%	30	
Claassenia sabulosa	0	0	2	0	2	0%	0.5	1.0
Isogenoides sp.	1	5	6	5	17	0%	4.3	2.2
Skwala sp.	10	14	32	22	78	1%	19.5	9.7
Isoperla sp.	0	1	3	1	5	0%	1.3	1.3
Pteronarcella badia	1	3	9	5	18	0%	4.5	3.4
Kathroperla perdita	1	0	0	0	1	0%	0.3	0.5
TRICHOPTERA						30%	602	
Cheumatopsyche spp.	6	17	14	10	47	1%	11.8	4.8
Hydropsyche occidentalis	345	239	334	226	1144	14%	286.0	62.2
Hydropsyche (C) cockerelli	194	330	140	208	872	11%	218.0	80.2
Hydropsyche (C) nr. morosa	5	0	1	8	14	0%	3.5	3.7
Hydropsyche (C) oslari ?	12	5	0	4	21	0%	5.3	5.0
Hydroptila spp.	26	67	70	67	230	3%	57.5	21.0
Ochrotrichia sp.	1	11	20	32	64	1%	16.0	13.2
Oecetis sp.	2	5	2	1	10	0%	2.5	1.7
Brachycentrus occidentalis	1	1	0	0	2	0%	0.5	0.6
Protoptila sp.	0	0	0	1	1	0%	0.3	0.5
Glossosoma sp.	1	0	1	0	2	0%	0.5	0.6
ANNELIDA						0%	5	
Naididae	1	0	0	2	3	0%	0.8	1.0
Tubificidae	0	0	0	16	16	0%	4.0	8.0
MOLLUSCA						0%	1	
Physella sp.	1	0	0	1	2	0%	0.5	0.6
OTHER								
Bryozoa	1	0	0	0	1	0%	0.3	0.5
ID's by D. McGuire								
TOTAL ORGANISMS	1766	2033	2582	1517	7898		1975	457
TAXA RICHNESS	39	34	33	35	50		35.3	2.6
SHAN. DIVERSITY	3.66	3.79	3.45	3.94	3.80		3.71	0.21
BIOTIC INDEX	4.77	4.65	4.81	4.89	4.78		4.78	0.10
EPT RICHNESS	18	16	18	18	24		17.5	1.0
% R.A. DOMINANT	20%	16%	24%	15%	16%		19%	4.2%
% R.A. FILTERERS	48%	45%	37%	43%	43%		43%	5%
METALS TOLERANCE	4.78	4.67	4.73	4.74	4.73		4.73	0.04
Baetidae/Ephemeroptera	0.20	0.25	0.05	0.29	0.15		0.20	0.10
Hydropsychinae/Trichoptera	0.95	0.88	0.84	0.82	0.87		0.87	0.06
EPT / (EPT + CHIR.)	0.75	0.76	0.80	0.76	0.77		0.77	0.02

B.10	MACROINVERTEBRATE DATA						
CLARK FORK RIVER at Sager Lane - STATION 08.5 - 14 AUG 99								

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S.D.
COLEOPTERA						8%	200	
Optioservus spp.	77	92	255	96	520	5%	130.0	83.7
Zaitzevia sp.	71	40	120	23	254	3%	63.5	42.6
Cleptelmis ornata	0	11	15	0	26	0%	6.5	7.7
DIPTERA						38%	907	
Thienemannimyia gp.	16	2	29	1	48	1%	12.0	13.2
Nilotanypus sp.	0	5	5	0	10	0%	2.5	2.9
Pentaneura sp.	1	0	0	0	1	0%	0.3	0.5
Pagastia sp	10	5	19	5	39	0%	9.8	6.6
Cardiocladius spp.	0	6	0	0	6	0%	1.5	3.0
Cricotopus spp.	77	35	57	22	191	2%	47.8	24.3
Eukiefferiella spp.	45	16	16	4	81	1%	20.3	17.4
Orthocladius spp.	4	72	15	9	100	1%	25.0	31.7
Parametriocnemus sp.	374	113	94	29	610	6%	152.5	152.0
Tvetenia sp.	194	175	100	92	561	6%	140.3	51.8
Cryptochironomus sp.	0	0	1	1	2	0%	0.5	0.6
Microtendipes sp	24	51	67	12	154	2%	38.5	25.0
Phaenopsectra sp	10	5	0	0	15	0%	3.8	4.8
Polypedilum spp.	125	234	54	59	472	5%	118.0	83.8
Tanytarsus sp.	1	0	0	0	1	0%	0.3	0.5
Micropsectra spp.	12	5	4	5	26	0%	6.5	3.7
Antocha sp.	10	5	2	0	17	0%	4.3	4.3
Limnophila sp.	0	5	0	0	5	0%	1.3	2.5
Hexatoma sp.	6	0	14	13	33	0%	8.3	6.6
Tipula sp.	0	5	11	2	18	0%	4.5	4.8
Atherix pachypus	0	0	5	0	5	0%	1.3	2.5
Simulium spp.	248	734	159	82	1223	13%	305.8	293.4
Chelifera sp.	0	0	6	5	11	0%	2.8	3.2
EPHEMEROPTERA						26%	616	
Baetis tricaudatus	80	56	111	49	296	3%	74.0	28.0
Baetis punctiventris	26	1	7	2	36	0%	9.0	11.6
Diphetor hageni	0	0	0	1	1	0%	0.3	0.5
Attenella margarita	23	42	15	33	113	1%	28.3	11.8
Tricorythodes minutus	990	168	706	152	2016	21%	504.0	413.8
HEMIPTERA								
Sigara sp.	0	1	0	0	1	0%	0.3	0.5
ODONATA								
Ophiogomphus sp.	2	0	0	1	3	0%	0.8	1.0

B.10 MACROINVERTEBRATE DATA

CLARK FORK RIVER at Sager Lane - STATION 08.5 - 14 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
PLECOPTERA						1%	34	
Isogenoides sp.	4	18	1	35	58	1%	14.5	15.5
Skwala sp.	9	4	1	11	25	0%	6.3	4.6
Isoperla sp.	19	10	2	2	33	0%	8.3	8.1
Pteronarcella badia	4	11	2	3	20	0%	5.0	4.1
TRICHOPTERA						25%	601	
Cheumatopsyche spp.	10	5	7	8	30	0%	7.5	2.1
Hydropsyche occidentalis	348	577	269	383	1577	17%	394.3	130.8
Hydropsyche (C) cockerelli	23	10	0	3	36	0%	9.0	10.2
Hydropsyche (C) nr. morosi	14	20	59	28	121	1%	30.3	20.0
Hydropsyche slossonae	1	0	0	0	1	0%	0.3	0.5
Hydroptila spp.	120	67	67	132	386	4%	96.5	34.4
Ochrotrichia sp.	93	50	32	68	243	3%	60.8	26.0
Brachycentrus occidentalis	3	1	0	0	4	0%	1.0	1.4
Glossosoma sp.	1	0	1	2	4	0%	1.0	0.8
ANNELIDA						1%	20	
Tubificidae	12	31	10	25	78	1%	19.5	10.1
CRUSTACEA								
Hyalella azteca	1	0	0	0	1	0%	0.3	0.5
MOLLUSCA						0%	2	
Physella sp.	1	5	0	1	7	0%	1.8	2.2
Gyraulus sp.	1	0	0	0	1	0%	0.3	0.5
ID's by D. McGuire								
TOTAL ORGANISMS	3090	2693	2338	1399	9520		2380	723
TAXA RICHNESS	40	38	36	36	50		37.5	1.9
SHAN. DIVERSITY	3.56	3.58	3.68	3.81	3.86		3.66	0.12
BIOTIC INDEX	4.81	5.34	4.75	4.96	4.97		4.97	0.26
EPT RICHNESS	17	15	14	16	18		15.5	1.3
% R.A. DOMINANT	32%	27%	30%	27%	21%		29%	2.3%
% R.A. FILTERERS	21%	50%	21%	36%	31%		32%	14%
METALS TOLERANCE	4.50	4.91	4.67	4.53	4.66		4.65	0.19
Baetidae/Ephemeroptera	0.09	0.21	0.14	0.22	0.14		0.17	0.06
Hydropsychinae/Trichoptera	0.65	0.84	0.77	0.68	0.73		0.73	0.09
EPT / (EPT + CHIR.)	0.66	0.59	0.74	0.79	0.68		0.70	0.09

CLARK FORK RIVER at Deer Lodge - STATION 09 - 14 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S.D.
COLEOPTERA						2%	72	
Optioservus spp.	46	10	45	21	122	1%	30.5	17.9
Zaitzevia sp.	57	70	15	22	164	1%	41.0	26.7
DIPTERA						34%	1347	
Thienemannimyia gp.	10	0	2	2	14	0%	3.5	4.4
Nilotanypus sp.	0	0	47	12	59	0%	14.8	22.2
Pentaneura sp.	0	0	22	0	22	0%	5.5	11.0
Pagastia sp	10	10	21	11	52	0%	13.0	5.4
Cardiocladius spp.	24	21	1	0	46	0%	11.5	12.8
Corynoneura sp	0	0	10	0	10	0%	2.5	5.0
Cricotopus spp.	92	46	737	494	1369	9%	342.3	331.3
Cricotopus nostococladius	0	0	1	0	1	0%	0.3	0.5
Eukiefferiella spp.	42	21	0	10	73	0%	18.3	18.0
Orthocladius spp.	235	52	14	31	332	2%	83.0	102.5
Parametriocnemus sp.	65	30	54	2	151	1%	37.8	28.0
Tvetenia sp.	190	37	6	1	234	1%	58.5	89.1
Microtendipes sp	1	1	23	50	75	0%	18.8	23.3
Paracladopelma sp.	0	0	11	30	41	0%	10.3	14.2
Phaenopsectra sp	0	0	1	40	41	0%	10.3	19.8
Polypedilum spp.	87	61	147	15	310	2%	77.5	55.1
Rheotanytarsus sp.	0	0	1	0	1	0%	0.3	0.5
Tanytarsus sp.	0	0	47	97	144	1%	36.0	46.3
Micropsectra spp.	0	0	22	1	23	0%	5.8	10.8
Antocha sp.	20	3	0	1	24	0%	6.0	9.4
Hexatoma sp.	3	3	4	25	35	0%	8.8	10.8
Tipula sp.	1	0	5	11	17	0%	4.3	5.0
Atherix pachypus	12	3	1	0	16	0%	4.0	5.5
Simulium spp.	910	810	239	309	2268	14%	567.0	342.0
Muscidae	0	0	14	1	15	0%	3.8	6.8
Chelifera sp.	11	1	1	0	13	0%	3.3	5.2
EPHEMEROPTERA						10%	404	
Acentrella insignificans	0	2	1	0	3	0%	0.8	1.0
Baetis tricaudatus	101	23	294	272	690	4%	172.5	131.8
Baetis punctiventris	1	1	257	69	328	2%	82.0	121.0
Attenella margarita	0	20	1	14	35	0%	8.8	9.8
Tricorythodes minutus	1	1	379	180	561	4%	140.3	180.2
ODONATA								
Ophiogomphus sp.	0	0	1	1	2	0%	0.5	0.6

B.11   MACROINVERTEBRATE   DATA

CLARK FORK RIVER at Deer Lodge - STATION 09 - 14 AUG 99

.

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
PLECOPTERA						0%	16	
Isogenoides sp.	12	2	12	14	40	0%	10.0	5.4
Skwala sp.	3	0	0	1	4	0%	1.0	1.4
Pteronarcella badia	10	4	3	3	20	0%	5.0	3.4
TRICHOPTERA						52%	2042	
Arctopsyche grandis	0	1	0	0	1	0%	0.3	0.5
Cheumatopsyche spp.	190	82	11	20	303	2%	75.8	82.4
Hydropsyche occidentalis	4000	1570	642	1220	7432	47%	1858.0	1478
Hydropsyche (C) cockerelli	61	42	11	0	114	1%	28.5	28.0
Hydropsyche (C) nr. morosa	3	32	31	3	69	0%	17.3	16.5
Hydroptila spp.	21	21	32	25	99	1%	24.8	5.2
Ochrotrichia sp.	65	33	12	2	112	1%	28.0	27.8
Nectopsyche sp.	0	0	0	2	2	0%	0.5	1.0
Oecetis sp.	10	0	0	6	16	0%	4.0	4.9
Brachycentrus occidentalis	11	4	4	1	20	0%	5.0	4.2
ANNELIDA						1%	37	
Tubificidae	20	10	15	104	149	1%	37.3	44.7
ID's by D. McGuire								
TOTAL ORGANISMS	6325	3027	3197	3123	15672		3918	1606
TAXA RICHNESS	33	32	42	38	48		36.3	4.6
SHAN. DIVERSITY	2.19	2.36	3.52	3.14	3.04		2.80	0.63
BIOTIC INDEX	5.19	5.28	5.49	5.52	5.33		5.37	0.16
EPT RICHNESS	14	15	14	15	18		14.5	0.6
% R.A. DOMINANT	63%	52%	23%	39%	47%		44%	17%
% R.A. FILTERERS	82%	84%	29%	50%	65%		61%	26%
METALS TOLERANCE	5.12	5.29	5.76	5.66	5.39		5.46	0.30
Baetidae/Ephemeroptera	0.99	0.55	0.59	0.64	0.63		0.69	0.20
Hydropsychinae/Trichoptera	0.98	0.97	0.94	0.97	0.97		0.96	0.02
EPT / (EPT + CHIR.)	0.86	0.87	0.59	0.70	0.77		0.75	0.13

B.12	MACROINVERTEBRATE DATA							
CLARK FORK RIVER above Little Blackfoot River - STATION 10 - 14 AUG 99								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						2%	58	
Optioservus spp.	34	73	17	11	135	1%	33.8	27.9
Zaitzevia sp.	14	42	20	20	96	1%	24.0	12.3
DIPTERA						49%	1258	
Thienemannimyia gp.	1	1	1	30	33	0%	8.3	14.5
Nilotanypus sp.	1	0	0	1	2	0%	0.5	0.6
Pentaneura sp.	0	0	1	0	1	0%	0.3	0.5
Pagastia sp	2	10	0	0	12	0%	3.0	4.8
Cardiocladius spp.	1	11	0	1	13	0%	3.3	5.2
Cricotopus spp.	40	115	24	200	379	4%	94.8	80.6
Eukiefferiella spp.	0	50	11	10	71	1%	17.8	22.1
Orthocladius spp.	22	216	2	46	286	3%	71.5	98.0
Parametriocnemus sp.	6	43	10	62	121	1%	30.3	26.9
Thienemanniella sp.	0	0	1	0	1	0%	0.3	0.5
Tvetenia sp.	18	219	6	25	268	3%	67.0	101.6
Microtendipes sp	13	0	0	0	13	0%	3.3	6.5
Polypedilum spp.	15	42	5	5	67	1%	16.8	17.5
Rheotanytarsus sp.	0	1	0	0	1	0%	0.3	0.5
Tanytarsus sp.	0	10	0	1	11	0%	2.8	4.9
Micropsectra spp.	1	20	0	0	21	0%	5.3	9.8
Antocha sp.	0	1	1	2	4	0%	1.0	0.8
Hexatoma sp.	24	53	14	10	101	1%	25.3	19.4
Tipula sp.	1	10	0	0	11	0%	2.8	4.9
Atherix pachypus	1	0	0	0	1	0%	0.3	0.5
Simulium spp.	423	1330	121	1740	3614	35%	903.5	758.2
EPHEMEROPTERA						13%	332	
Acentrella insignificans	1	0	7	0	8	0%	2.0	3.4
Baetis tricaudatus	109	112	79	319	619	6%	154.8	110.5
Baetis punctiventris	22	10	7	21	60	1%	15.0	7.6
Attenella margarita	37	31	16	7	91	1%	22.8	13.7
Serratella tibialis	0	2	0	0	2	0%	0.5	1.0
Drunella grandis	0	1	0	0	1	0%	0.3	0.5
Tricorythodes minutus	68	196	60	223	547	5%	136.8	84.8
ODONATA								
Ophiogomphus sp.	0	0	5	0	5	0%	1.3	2.5

B.12   MACROINVERTEBRATE   DATA

CLARK FORK RIVER above Little Blackfoot River - STATION 10 - 14 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
PLECOPTERA						1%	21	
Isogenoides sp.	21	8	21	12	62	1%	15.5	6.6
Skwala sp.	5	2	2	0	9	0%	2.3	2.1
Isoperla sp.	1	0	0	0	1	0%	0.3	0.5
Pteronarcella badia	0	6	0	2	8	0%	2.0	2.8
Chloroperlinae	2	0	0	0	2	0%	0.5	1.0
TRICHOPTERA						35%	907	
Arctopsyche grandis	0	1	0	1	2	0%	0.5	0.6
Cheumatopsyche spp.	73	413	31	198	715	7%	178.8	171.5
Hydropsyche occidentalis	370	1270	269	427	2336	23%	584.0	462.0
Hydropsyche (C) cockerelli	0	56	1	3	60	1%	15.0	27.4
Hydropsyche (C) nr. morosa	34	34	11	30	109	1%	27.3	11.0
Limnephilus sp.	1	0	0	1	2	0%	0.5	0.6
Hydroptila spp.	40	77	16	73	206	2%	51.5	28.9
Ochrotrichia sp.	36	51	24	65	176	2%	44.0	17.8
Nectopsyche sp.	1	0	0	0	1	0%	0.3	0.5
Oecetis sp.	0	3	0	0	3	0%	0.8	1.5
Brachycentrus occidentalis	7	4	5	1	17	0%	4.3	2.5
ANNELIDA						0%	4	
Tubificidae	0	0	13	1	14	0%	3.5	6.4
ID's by D. McGuire								
TOTAL ORGANISMS	1445	4524	801	3548	10318		2580	1748
TAXA RICHNESS	34	36	30	31	48		32.8	2.8
SHAN. DIVERSITY	3.38	3.22	3.51	2.73	3.25		3.21	0.34
BIOTIC INDEX	5.10	5.28	4.96	5.45	5.29		5.20	0.21
EPT RICHNESS	17	18	14	15	23		16.0	1.8
% R.A. DOMINANT	29%	29%	34%	49%	35%		35%	9.4%
% R.A. FILTERERS	63%	69%	55%	68%	66%		63%	6%
METALS TOLERANCE	5.05	5.18	4.95	5.58	5.28		5.19	0.27
Baetidae/Ephemeroptera	0.56	0.35	0.55	0.60	0.52		0.51	0.11
Hydropsychinae/Trichoptera	0.85	0.93	0.87	0.82	0.89		0.87	0.04
EPT / (EPT + CHIR.)	0.87	0.76	0.90	0.78	0.79		0.83	0.07

B.13   M A C R O I N V E R T E B R A T E   D A T A

LITTLE BLACKFOOT RIVER near mouth - STATION 10.2 - 14 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						6%	43	
Optioservus spp.	34	14	23	9	·80	3%	20.0	11.0
Zaitzevia sp.	39	20	24	7	90	3%	22.5	13.2
DIPTERA						64%	433	
Nilotanypus sp.	0	0	0	1	1	0%	0.3	0.5
Pagastia sp	9	3	6	3	21	1%	5.3	2.9
Potthastia spp.	13	2	2	2	19	1%	4.8	5.5
Cardiocladius spp.	3	37	13	4	57	2%	14.3	15.8
Cricotopus spp.	14	2	13	5	34	1%	8.5	5.9
Cricotopus nostococladius	67	109	61	20	257	9%	64.3	36.4
Eukiefferiella spp.	3	2	1	1	7	0%	1.8	1.0
Orthocladius spp.	13	8	21	13	55	2%	13.8	5.4
Parametriocnemus sp.	4	1	1	0	6	0%	1.5	1.7
Tvetenia sp.	12	23	29	4	68	3%	17.0	11.2
Microtendipes sp	1	0	1	4	6	0%	1.5	1.7
Polypedilum spp.	30	31	39	3	103	4%	25.8	15.7
Rheotanytarsus sp.	39	60	122	88	309	11%	77.3	36.0
Tanytarsus sp.	3	0	20	0	23	1%	5.8	9.6
Micropsectra spp.	68	112	161	40	381	14%	95.3	52.9
Antocha sp.	39	14	29	13	95	4%	23.8	12.5
Hexatoma sp.	14	2	22	2	40	1%	10.0	9.8
Atherix pachypus	5	1	2	11	19	1%	4.8	4.5
Simulium (Eusimulium)	23	95	93	7	218	8%	54.5	46.1
Chelifera sp.	1	1	0	10	12	0%	3.0	4.7
EPHEMEROPTERA						11%	72	
Acentrella insignificans	0	4	8	3	15	1%	3.8	3.3
Baetis tricaudatus	30	21	57	34	142	5%	35.5	15.3
Attenella margarita	20	3	21	23	67	2%	16.8	9.3
Serratella tibialis	4	11	8	7	30	1%	7.5	2.9
Drunella grandis	3	0	3	4	10	0%	2.5	1.7
Timpango hecuba	1	0	0	0	1	0%	0.3	0.5
Nixe sp.	5	1	1	0	7	0%	1.8	2.2
Paraleptophlebia sp.	0	0	1	0	1	0%	0.3	0.5
Tricorythodes minutus	3	8	2	3	16	1%	4.0	2.7

B.13   M A C R O I N V E R T E B R A T E   D A T A

LITTLE BLACKFOOT RIVER near mouth - STATION 10.2 - 14 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
PLECOPTERA						4%	25	
Calineuria californica	0	0	1	0	1	0%	0.3	0.5
Claassenia sabulosa	1	2	5	3	11	0%	2.8	1.7
Hesperoperla pacifica	1	1	2	1	5	0%	1.3	0.5
Skwala sp.	9	8	8	2	27	1%	6.8	3.2
Pteronarcys californica	1	1	0	0	2	0%	0.5	0.6
Kathroperla perdita	0	0	1	0	1	0%	0.3	0.5
Chloroperlinae	21	9	18	3	51	2%	12.8	8.3
TRICHOPTERA						14%	95	
Arctopsyche grandis	11	20	12	5	48	2%	12.0	6.2
Hydropsyche occidentalis	0	1	0	3	4	0%	1.0	1.4
Hydropsyche (C) cockerelli	15	18	17	15	65	2%	16.3	1.5
Hydropsyche (C) oslari?	30	32	19	10	91	3%	22.8	10.2
Hydroptila spp.	5	0	6	0	11	0%	2.8	3.2
Stactiobellia sp.	2	0	5	7	14	1%	3.5	3.1
Lepidostoma sp.	6	2	23	5	36	1%	9.0	9.5
Psychomyia flavida	2	0	1	1	4	0%	1.0	0.8
Brachycentrus americanus	0	0	1	0	1	0%	0.3	0.5
Brachycentrus occidentalis	5	6	8	5	24	1%	6.0	1.4
Rhyacophila colo gp.	11	10	2	3	26	1%	6.5	4.7
Glossosoma sp.	4	1	12	40	57	2%	14.3	17.8
ANNELIDA						2%	10	
Enchytrieadae	11	5	16	8	40	1%	10.0	4.7
Tubificidae	0	0	1	0	1	0%	0.3	0.5
ID's by D. McGuire								
TOTAL ORGANISMS	635	701	942	432	2710		678	210
TAXA RICHNESS	44	39	47	41	52		42.8	3.5
SHAN. DIVERSITY	4.70	4.08	4.42	4.42	4.61		4.41	0.25
BIOTIC INDEX	4.09	4.53	4.36	3.98	4.28		4.24	0.25
EPT RICHNESS	22	19	25	20	28		21.5	2.6
% R.A. DOMINANT	11%	16%	17%	20%	14%		16%	4.0%
% R.A. FILTERERS	19%	33%	29%	31%	28%		28%	6%
METALS TOLERANCE	3.69	3.78	3.19	2.93	3.42		3.40	0.40
Baetidae/Ephemeroptera	0.45	0.52	0.64	0.50	0.54		0.53	0.08
Hydropsychinae/Trichoptera	0.49	0.57	0.34	0.30	0.42		0.42	0.13
EPT / (EPT + CHIR.)	0.41	0.29	0.33	0.48	0.36		0.38	0.09

B.14 MACROINVERTEBRATE DATA

CLARK FORK RIVER at Gold Creek Bridge - STATION 11 - 14 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						3%	47	
Optioservus spp.	21	26	45	34	126	2%	31.5	10.5
Zaitzevia sp.	12	14	26	8	60	1%	15.0	7.7
DIPTERA						60%	833	
Thienemannimyia gp.	7	0	7	3	17	0%	4.3	3.4
Pentaneura sp.	5	0	2	2	9	0%	2.3	2.1
Pagastia sp	5	4	3	0	12	0%	3.0	2.2
Cardiocladius spp.	1	4	0	0	5	0%	1.3	1.9
Cricotopus spp.	68	9	16	11	104	2%	26.0	28.2
Cricotopus nostococladius	2	3	0	1	6	0%	1.5	1.3
Eukiefferiella spp.	28	5	0	4	37	1%	9.3	12.7
Orthocladius spp.	67	26	17	7	117	2%	29.3	26.3
Parametriocnemus sp.	28	0	0	0	28	1%	7.0	14.0
Tvetenia sp.	14	14	10	5	43	1%	10.8	4.3
Microtendipes sp	6	3	28	10	47	1%	11.8	11.2
Polypedilum spp.	58	15	28	27	128	2%	32.0	18.3
Rheotanytarsus sp.	0	0	0	1	1	0%	0.3	0.5
Tanytarsus sp.	1	0	0	1	2	0%	0.5	0.6
Micropsectra spp.	3	0	2	1	6	0%	1.5	1.3
Antocha sp.	6	5	5	7	23	0%	5.8	1.0
Hexatoma sp.	4	8	17	12	41	1%	10.3	5.6
Atherix pachypus	0	1	0	0	1	0%	0.3	0.5
Simulium spp.	1600	811	185	109	2705	49%	676.3	691.5
EPHEMEROPTERA						22%	311	
Acentrella insignificans	0	0	18	3	21	0%	5.3	8.6
Baetis tricaudatus	161	47	110	62	380	7%	95.0	51.6
Baetis punctiventris	10	1	3	4	18	0%	4.5	3.9
Centroptilum sp.	0	0	1	0	1	0%	0.3	0.5
Diphetor hageni	5	0	0	0	5	0%	1.3	2.5
Attenella margarita	73	16	41	18	148	3%	37.0	26.5
Ephemerella inermis	0	0	0	1	1	0%	0.3	0.5
Drunella grandis	0	3	0	0	3	0%	0.8	1.5
Paraleptophlebia bicornuta	0	0	0	2	2	0%	0.5	1.0
Tricorythodes minutus	305	12	260	88	665	12%	166.3	139.0
LEPIDOPTERA								
Petrophila sp.	0	0	1	1	2	0%	0.5	0.6

B.14   M A C R O I N V E R T E B R A T E   D A T A
CLARK FORK RIVER at Gold Creek Bridge - STATION 11 - 14 AUG 99

.

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
PLECOPTERA						0%	5	
Isogenoides sp.	5	3	0	3	11	0%	2.8	2.1
Skwala sp.	1	2	1	0	4	0%	1.0	0.8
Isoperla sp.	1	0	0	0	1	0%	0.3	0.5
Pteronarcella badia	1	0	0	0	1	0%	0.3	0.5
Kathroperla perdita	1	0	0	0	1	0%	0.3	0.5
TRICHOPTERA						14%	194	
Arctopsyche grandis	2	1	4	0	7	0%	1.8	1.7
Cheumatopsyche spp.	11	26	3	2	42	1%	10.5	11.1
Hydropsyche occidentalis	227	84	48	28	387	7%	96.8	89.9
Hydropsyche cockerelli	46	72	26	16	160	3%	40.0	24.7
Hydropsyche nr. morosa	1	1	1	0	3	0%	0.8	0.5
Hydroptila spp.	8	28	48	15	99	2%	24.8	17.6
Ochrotrichia sp.	8	0	0	0	8	0%	2.0	4.0
Lepidostoma sp.	16	0	3	0	19	0%	4.8	7.6
Nectopsyche sp.	0	0	1	0	1	0%	0.3	0.5
Oecetis sp.	0	6	10	8	24	0%	6.0	4.3
Brachycentrus occidentalis	5	2	3	1	11	0%	2.8	1.7
Helicopsyche borealis	0	0	0	1	1	0%	0.3	0.5
Protoptila sp.	0	3	0	0	3	0%	0.8	1.5
Glossosoma sp.	1	7	1	1	10	0%	2.5	3.0
ANNELIDA						0%	1	
Tubificidae	0	0	3	0	3	0%	0.8	1.5
CRUSTACEA								
Hyalella azteca	1	0	0	0	1	0%	0.3	0.5
ID's by D. McGuire								
TOTAL ORGANISMS	2825	1262	977	497	5561		1390	1007
TAXA RICHNESS	40	32	34	34	53		35.0	3.5
SHAN. DIVERSITY	2.57	2.37	3.63	3.81	3.04		3.09	0.73
BIOTIC INDEX	5.41	5.50	4.74	4.90	5.27		5.14	0.37
EPT RICHNESS	20	17	18	16	29		17.8	1.7
% R.A. DOMINANT	57%	64%	27%	22%	49%		42%	21%
% R.A. FILTERERS	67%	79%	28%	32%	60%		51%	26%
METALS TOLERANCE	5.39	5.47	4.56	4.68	5.20		5.02	0.47
Baetidae/Ephemeroptera	0.32	0.61	0.30	0.39	0.34		0.40	0.14
Hydropsychinae/Trichoptera	0.88	0.80	0.53	0.64	0.76		0.71	0.16
EPT / (EPT + CHIR.)	0.75	0.79	0.84	0.78	0.78		0.79	0.04

B.15 MACROINVERTEBRATE DATA

FLINT CREEK at New Chicago - STATION 11.5 - 13 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						7%	29	
Optioservus spp.	40	6	22	39	107	7%	26.8	16.1
Zaitzevia sp.	1	0	2	5	8	1%	2.0	2.2
Lara sp.	1	0	0	0	1	0%	0.3	0.5
DIPTERA						27%	105	
Pagastia sp	7	8	3	31	49	3%	12.3	12.7
Brillia sp.	0	0	0	1	1	0%	0.3	0.5
Cardiocladius spp.	0	0	0	1	1	0%	0.3	0.5
Corynoneura sp	1	0	1	0	2	0%	0.5	0.6
Cricotopus spp.	89	13	17	62	181	12%	45.3	36.7
Eukiefferiella spp.	4	4	3	6	17	1%	4.3	1.3
Orthocladius spp.	1	2	0	4	7	0%	1.8	1.7
Parametriocnemus sp.	5	0	8	3	16	1%	4.0	3.4
Tvetenia sp.	4	1	1	10	16	1%	4.0	4.2
Microtendipes sp	0	0	4	0	4	0%	1.0	2.0
Paracladopelma sp.	0	0	1	0	1	0%	0.3	0.5
Phaenopsectra sp	0	1	2	0	3	0%	0.8	1.0
Polypedilum spp.	25	4	10	34	73	5%	18.3	13.7
Rheotanytarsus sp.	0	0	3	1	4	0%	1.0	1.4
Micropsectra spp.	1	0	1	0	2	0%	0.5	0.6
Antocha sp.	3	1	3	5	12	1%	3.0	1.6
Dicranota sp.	1	0	0	0	1	0%	0.3	0.5
Hexatoma sp.	0	0	1	3	4	0%	1.0	1.4
Simulium spp.	0	13	12	0	25	2%	6.3	7.2
Chelifera sp.	1	0	0	1	2	0%	0.5	0.6
EPHEMEROPTERA						15%	61	
Acentrella insignificans	2	0	1	0	3	0%	0.8	1.0
Baetis tricaudatus	15	14	18	34	81	5%	20.3	9.3
Baetis punctiventris	1	0	4	0	5	0%	1.3	1.9
Diphetor hageni	1	0	2	0	3	0%	0.8	1.0
Attenella margarita	1	0	0	1	2	0%	0.5	0.6
Serratella tibialis	0	0	0	1	1	0%	0.3	0.5
Drunella grandis	0	0	0	7	7	0%	1.8	3.5
Timpango hecuba	0	0	1	0	1	0%	0.3	0.5
Heptagenia sp.	2	0	3	2	7	0%	1.8	1.3
Nixe sp.	0	0	1	1	2	0%	0.5	0.6
Tricorythodes minutus	59	4	37	30	130	8%	32.5	22.7

B.15 MACROINVERTEBRATE DATA
FLINT CREEK at New Chicago - STATION 11.5 - 13 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
PLECOPTERA						6%	25	
Claassenia sabulosa	2	0	0	0	2	0%	0.5	1.0
Hesperoperla pacifica	0	0	3	1	4	0%	1.0	1.4
Malenka sp.	1	0	0	0	1	0%	0.3	0.5
Isogenoides sp.	5	0	1	2	8	1%	2.0	2.2
Skwala sp.	1	3	10	10	24	2%	6.0	4.7
Isoperla sp.	1	0	0	0	1	0%	0.3	0.5
Pteronarcella badia	1	6	6	14	27	2%	6.8	5.4
Pteronarcys californica	1	1	12	17	31	2%	7.8	8.1
TRICHOPTERA						40%	157	
Arctopsyche grandis	6	3	7	14	30	2%	7.5	4.7
Cheumatopsyche spp.	0	0	2	1	3	0%	0.8	1.0
Hydropsyche occidentalis	68	61	65	100	294	19%	73.5	17.9
Hydropsyche (C) cockerelli	21	22	21	23	87	6%	21.8	1.0
Hydroptila spp.	5	2	3	0	10	1%	2.5	2.1
Ochrotrichia sp.	1	0	0	0	1	0%	0.3	0.5
Oecetis sp.	1	0	0	0	1	0%	0.3	0.5
Brachycentrus occidentalis	20	18	19	141	198	13%	49.5	61.0
Rhyacophila brunnea gp.	0	0	0	1	1	0%	0.3	0.5
Glossosoma sp.	0	0	0	3	3	0%	0.8	1.5
ANNELIDA						4%	17	
Naididae	0	1	0	4	5	0%	1.3	1.9
Tubificidae	33	1	26	1	61	4%	15.3	16.7
Erpobdellidae	0	0	1	0	1	0%	0.3	0.5
ID's by D. McGuire								
TOTAL ORGANISMS	432	189	337	614	1572		393	178
TAXA RICHNESS	37	22	38	36	55		33.3	7.5
SHAN. DIVERSITY	3.74	3.45	4.27	3.83	4.13		3.82	0.34
BIOTIC INDEX	5.33	4.53	4.86	3.93	4.59		4.66	0.59
EPT RICHNESS	21	10	19	19	29		17.3	4.9
% R.A. DOMINANT	21%	32%	19%	23%	19%		24%	5.9%
% R.A. FILTERERS	27%	62%	38%	46%	41%		43%	15%
METALS TOLERANCE	5.62	5.14	4.57	4.74	4.99		5.02	0.47
Baetidae/Ephemeroptera	0.23	0.78	0.37	0.45	0.38		0.46	0.23
Hydropsychinae/Trichoptera	0.73	0.78	0.75	0.44	0.61		0.68	0.16
EPT / (EPT + CHIR.)	0.61	0.80	0.80	0.72	0.72		0.73	0.09

B.16 MACROINVERTEBRATE DATA

CLARK FORK RIVER at Bearmouth - STATION 11.7 - 13 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						3%	77	
Optioservus spp.	37	10	48	21	116	1%	29.0	16.8
Zaitzevia sp.	56	27	26	82	191	2%	47.8	26.7
Hydrophilidae	1	0	0	0	1	0%	0.3	0.5
DIPTERA						31%	718	
Thienemannimyia gp.	5	5	3	50	63	1%	15.8	22.9
Pentaneura sp.	11	0	2	1	14	0%	3.5	5.1
Pagastia sp.	0	3	3	10	16	0%	4.0	4.2
Cricotopus spp.	8	27	11	11	57	1%	14.3	8.6
Eukiefferiella spp.	11	15	4	60	90	1%	22.5	25.4
Orthocladius spp.	5	12	11	64	92	1%	23.0	27.5
Parametriocnemus sp.	16	1	1	22	40	0%	10.0	10.7
Tvetenia sp.	40	37	3	50	130	1%	32.5	20.4
Microtendipes sp	213	232	212	189	846	9%	211.5	17.6
Phaenopsectra sp	29	5	7	20	61	1%	15.3	11.3
Polypedilum spp.	294	65	57	418	834	9%	208.5	177.7
Rheotanytarsus sp.	42	5	12	21	80	1%	20.0	16.1
Tanytarsus sp.	52	27	15	13	107	1%	26.8	17.9
Micropsectra spp.	0	1	5	11	17	0%	4.3	5.0
Antocha sp.	75	76	65	42	258	3%	64.5	15.8
Hexatoma sp.	16	10	6	15	47	0%	11.8	4.6
Atherix pachypus	0	1	0	0	1	0%	0.3	0.5
Simulium spp.	21	15	5	75	116	1%	29.0	31.4
Muscidae	0	0	1	1	2	0%	0.5	0.6
Chelifera sp.	1	0	0	0	1	0%	0.3	0.5
EPHEMEROPTERA						23%	536	
Acentrella insignificans	57	62	33	175	327	3%	81.8	63.4
Baetis tricaudatus	198	82	50	413	743	8%	185.8	164.3
Baetis punctiventris	45	28	16	150	239	3%	59.8	61.3
Diphetor hageni	31	21	3	21	76	1%	19.0	11.7
Attenella margarita	51	30	71	52	204	2%	51.0	16.8
Drunella grandis	5	0	1	0	6	0%	1.5	2.4
Epeorus albertae	0	0	0	1	1	0%	0.3	0.5
Heptagenia sp.	7	5	4	2	18	0%	4.5	2.1
Tricorythodes minutus	135	92	48	254	529	6%	132.3	88.6
LEPIDOPTERA								
Petrophila sp.	0	5	13	4	22	0%	5.5	5.4

B.16   M A C R O I N V E R T E B R A T E   D A T A

CLARK FORK RIVER at Bearmouth - STATION 11.7 - 13 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
PLECOPTERA						1%	16	
Claassenia sabulosa	0	1	0	2	3	0%	0.8	1.0
Hesperoperla pacifica	1	0	0	0	1	0%	0.3	0.5
Isogenoides sp.	13	8	5	15	41	0%	10.3	4.6
Skwala sp.	3	1	6	6	16	0%	4.0	2.4
Isoperla sp.	1	0	0	0	1	0%	0.3	0.5
Pteronarcys californica	0	1	0	0	1	0%	0.3	0.5
Chloroperlinae	0	0	1	0	1	0%	0.3	0.5
TRICHOPTERA						42%	999	
Arctopsyche grandis	4	2	0	2	8	0%	2.0	1.6
Cheumatopsyche spp.	5	5	1	0	11	0%	2.8	2.6
Hydropsyche occidentalis	990	662	124	583	2359	25%	589.8	357.0
Hydropsyche cockerelli	78	35	11	11	135	1%	33.8	31.6
Hydropsyche nr. morosa	5	0	3	2	10	0%	2.5	2.1
Hydroptila spp.	73	83	52	378	586	6%	146.5	154.9
Neotrichia sp.	0	1	0	0	1	0%	0.3	0.5
Ochrotrichia sp.	63	56	27	81	227	2%	56.8	22.5
Nectopsyche sp.	1	2	1	1	5	0%	1.3	0.5
Oecetis sp.	38	50	28	14	130	1%	32.5	15.3
Brachycentrus occidentalis	160	56	166	73	455	5%	113.8	57.3
Protoptila sp.	5	0	0	0	5	0%	1.3	2.5
Glossosoma sp.	28	31	6	0	65	1%	16.3	15.5
ANNELIDA						0%	0	
Tubificidae	0	0	0	1	1	0%	0.3	0.5
ID's by D. McGuire								
TOTAL ORGANISMS	2930	1893	1167	3417	9407		2352	1014
TAXA RICHNESS	43	42	42	42	54		42.3	0.5
SHAN. DIVERSITY	3.82	3.78	4.17	4.04	4.11		3.95	0.19
BIOTIC INDEX	4.80	4.88	4.54	5.02	4.86		4.81	0.20
EPT RICHNESS	24	22	21	20	29		21.8	1.7
% R.A. DOMINANT	34%	35%	18%	17%	25%		26%	9.7%
% R.A. FILTERERS	45%	41%	28%	22%	34%		34%	11%
METALS TOLERANCE	4.21	4.32	3.87	4.29	4.22		4.17	0.21
Baetidae/Ephemeroptera	0.63	0.60	0.45	0.71	0.65		0.60	0.11
Hydropsychinae/Trichoptera	0.74	0.71	0.33	0.52	0.63		0.58	0.19
EPT / (EPT + CHIR.)	0.73	0.75	0.66	0.70	0.72		0.71	0.04

B.17   M A C R O I N V E R T E B R A T E   D A T A

CLARK FORK RIVER at Bonita - STATION 12 - 13 AUG 99

.

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						3%	45	
Optioservus spp.	11	26	27	21	85	1%	21.3	7.3
Zaitzevia sp.	13	17	27	38	95	2%	23.8	11.2
DIPTERA						13%	211	
Thienemannimyia gp.	8	0	3	22	33	1%	8.3	9.7
Nilotanypus sp.	0	0	1	0	1	0%	0.3	0.5
Corynoneura sp	4	0	0	0	4	0%	1.0	2.0
Cricotopus spp.	2	1	13	7	23	0%	5.8	5.5
Eukiefferiella spp.	1	0	1	0	2	0%	0.5	0.6
Orthocladius spp.	8	6	27	2	43	1%	10.8	11.1
Parametriocnemus sp.	1	0	1	1	3	0%	0.8	0.5
Tvetenia sp.	18	2	37	12	69	1%	17.3	14.7
Cryptochironomus sp.	0	0	0	3	3	0%	0.8	1.5
Microtendipes sp	21	4	2	176	203	3%	50.8	83.9
Phaenopsectra sp	0	0	1	4	5	0%	1.3	1.9
Polypedilum spp.	28	11	76	68	183	3%	45.8	31.3
Stempellina sp.	0	0	0	1	1	0%	0.3	0.5
Rheotanytarsus sp.	11	0	6	3	20	0%	5.0	4.7
Tanytarsus sp.	2	1	0	6	9	0%	2.3	2.6
Micropsectra spp.	0	1	0	1	2	0%	0.5	0.6
Antocha sp.	25	27	44	33	129	2%	32.3	8.5
Hexatoma sp.	5	5	11	9	30	0%	7.5	3.0
Atherix pachypus	5	4	10	0	19	0%	4.8	4.1
Simulium (Psilozoa)	15	6	19	1	41	1%	10.3	8.2
Chelifera sp.	3	3	3	10	19	0%	4.8	3.5
EPHEMEROPTERA						33%	516	
Acentrella insignificans	37	26	66	36	165	3%	41.3	17.2
Baetis tricaudatus	101	45	158	66	370	6%	92.5	49.4
Baetis punctiventris	5	4	4	12	25	0%	6.3	3.9
Diphetor hageni	1	3	53	19	76	1%	19.0	24.1
Attenella margarita	84	42	117	135	378	6%	94.5	40.9
Serratella tibialis	2	2	4	2	10	0%	2.5	1.0
Ephemerella inermis	1	0	2	12	15	0%	3.8	5.6
Drunella grandis	11	1	10	11	33	1%	8.3	4.9
Heptagenia sp.	4	1	2	5	12	0%	3.0	1.8
Rhithrogena sp.	0	1	6	0	7	0%	1.8	2.9
Tricorythodes minutus	182	26	117	647	972	15%	243.0	276.8
LEPIDOPTERA								
Petrophila sp.	1	9	10	24	44	1%	11.0	9.6

B.17 MACROINVERTEBRATE DATA
CLARK FORK RIVER at Bonita - STATION 12 - 13 AUG 99

.

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
PLECOPTERA						2%	32	
Claassenia sabulosa	2	4	5	2	13	0%	3.3	1.5
Hesperoperla pacifica	0	0	0	2	2	0%	0.5	1.0
Isogenoides sp.	10	22	19	58	109	2%	27.3	21.1
Skwala sp.	0	0	0	2	2	0%	0.5	1.0
Pteronarcys californica	0	0	0	1	1	0%	0.3	0.5
Chloroperlinae	0	0	0	1	1	0%	0.3	0.5
TRICHOPTERA						48%	763	
Arctopsyche grandis	5	1	2	2	10	0%	2.5	1.7
Cheumatopsyche spp.	6	23	31	65	125	2%	31.3	24.8
Hydropsyche (H.) occidenta	483	301	904	261	1949	31%	487.3	294.2
Hydropsyche (C.) cockerelli	40	24	55	33	152	2%	38.0	13.1
Hydropsyche (C.) nr. moros	3	0	5	0	8	0%	2.0	2.4
Hydroptila spp.	77	46	48	107	278	4%	69.5	28.7
Neotrichia sp.	4	2	15	55	76	1%	19.0	24.7
Ochrotrichia sp.	5	18	12	3	38	1%	9.5	6.9
Lepidostoma sp.	1	0	0	0	1	0%	0.3	0.5
Nectopsyche sp.	6	1	0	1	8	0%	2.0	2.7
Oecetis sp.	3	16	7	23	49	1%	12.3	9.0
Brachycentrus occidentalis	42	25	73	175	315	5%	78.8	67.2
Glossosoma sp.	2	14	15	13	44	1%	11.0	6.1
ID's by D. McGuire								
TOTAL ORGANISMS	1299	771	2049	2191	6310		1578	665
TAXA RICHNESS	44	38	43	47	54		43.0	3.7
SHAN. DIVERSITY	3.53	3.69	3.46	3.86	3.87		3.64	0.18
BIOTIC INDEX	4.50	4.48	4.52	4.25	4.42		4.44	0.13
EPT RICHNESS	25	23	24	27	30		24.8	1.7
% R.A. DOMINANT	37%	39%	44%	30%	31%		37%	6%
% R.A. FILTERERS	47%	49%	53%	25%	42%		43%	13%
METALS TOLERANCE	4.24	4.22	4.34	3.81	4.12		4.15	0.23
Baetidae/Ephemeroptera	0.34	0.52	0.52	0.14	0.31		0.38	0.18
Hydropsychinae/Trichoptera	0.79	0.74	0.85	0.49	0.73		0.72	0.16
EPT / (EPT + CHIR.)	0.91	0.96	0.91	0.85	0.90		0.91	0.05

B.18	MACROINVERTEBRATE DATA							
ROCK CREEK near Clinton - STATION 12.5 - 13 AUG 99								
.								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						1%	6	
Optioservus spp.	5	1	7	5	18	1%	4.5	2.5
Zaitzevia sp.	0	2	1	1	4	0%	1.0	0.8
Ordobrevia sp.	0	0	1	0	1	0%	0.3	0.5
DIPTERA						63%	298	
Pagastia sp	13	25	24	35	97	5%	24.3	9.0
Potthastia spp.	0	0	1	1	2	0%	0.5	0.6
Corynoneura sp	2	0	1	1	4	0%	1.0	0.8
Cricotopus spp.	10	32	31	33	106	6%	26.5	11.0
Cricotopus nostococladius	1	3	1	7	12	1%	3.0	2.8
Eukiefferiella spp.	16	112	30	53	211	11%	52.8	42.3
Orthocladius spp.	36	89	50	73	248	13%	62.0	23.6
Parametriocnemus sp.	0	0	1	0	1	0%	0.3	0.5
Tvetenia sp.	18	50	43	15	126	7%	31.5	17.6
Microtendipes sp	0	0	1	0	1	0%	0.3	0.5
Polypedilum spp.	3	5	12	6	26	1%	6.5	3.9
Rheotanytarsus sp.	10	0	11	0	21	1%	5.3	6.1
Tanytarsus sp.	1	0	1	0	2	0%	0.5	0.6
Micropsectra spp.	65	19	60	57	201	11%	50.3	21.1
Antocha sp.	3	8	10	12	33	2%	8.3	3.9
Hexatoma sp.	6	0	8	2	16	1%	4.0	3.7
Atherix pachypus	0	2	1	2	5	0%	1.3	1.0
Simulium spp.	3	4	59	11	77	4%	19.3	26.7
Chelifera sp.	0	0	1	0	1	0%	0.3	0.5
EPHEMEROPTERA						25%	117	
Ameletus sp.	0	0	1	1	2	0%	0.5	0.6
Acentrella insignificans	21	22	24	28	95	5%	23.8	3.1
Baetis tricaudatus	13	8	22	37	80	4%	20.0	12.7
Diphetor hageni	2	0	0	0	2	0%	0.5	1.0
Attenella margarita	3	5	16	7	31	2%	7.8	5.7
Serratella tibialis	19	2	29	13	63	3%	15.8	11.3
Drunella doddsi	5	3	5	5	18	1%	4.5	1.0
Drunella grandis	3	7	7	3	20	1%	5.0	2.3
Cinygmula sp.	0	0	1	0	1	0%	0.3	0.5
Epeorus albertae	19	16	21	24	80	4%	20.0	3.4
Nixe sp.	16	7	14	9	46	2%	11.5	4.2
Rhithrogena sp.	2	1	6	14	23	1%	5.8	5.9
Tricorythodes minutus	3	1	1	1	6	0%	1.5	1.0

B.18   M A C R O I N V E R T E B R A T E   D A T A

ROCK CREEK near Clinton - STATION 12.5 - 13 AUG 99

.

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
PLECOPTERA						2%	8	
Claassenia sabulosa	1	1	2	0	4	0%	1.0	0.8
Hesperoperla pacifica	3	0	1	1	5	0%	1.3	1.3
Skwala sp.	3	0	0	0	3	0%	0.8	1.5
Pteronarcys californica	5	1	0	1	7	0%	1.8	2.2
Chloroperlinae	2	1	2	9	14	1%	3.5	3.7
TRICHOPTERA						9%	43	
Arctopsyche grandis	1	1	11	2	15	1%	3.8	4.9
Hydropsyche occidentalis	4	3	4	2	13	1%	3.3	1.0
Hydropsyche (C) cockerelli	5	4	12	6	27	1%	6.8	3.6
Hydroptila spp.	1	2	1	0	4	0%	1.0	0.8
Wormaldia sp.	0	1	0	0	1	0%	0.3	0.5
Brachycentrus americanus	0	4	3	1	8	0%	2.0	1.8
Brachycentrus occidentalis	7	42	27	18	94	5%	23.5	14.8
Rhyacophila angelita gp.	0	1	0	2	3	0%	0.8	1.0
Glossosoma sp.	2	1	4	0	7	0%	1.8	1.7
ANNELIDA						0%	2	
Lumbricidae	2	0	0	1	3	0%	0.8	1.0
Naididae	2	0	0	1	3	0%	0.8	1.0
Tubificidae	0	0	1	0	1	0%	0.3	0.5
MOLLUSCA						1%	3	
Sphaeriidae	0	10	1	1	12	1%	3.0	4.7
ID's by D. McGuire								
TOTAL ORGANISMS	336	496	571	501	1904		476	99
TAXA RICHNESS	39	36	46	39	53		40.0	4.2
SHAN. DIVERSITY	4.41	3.80	4.56	4.27	4.48		4.26	0.33
BIOTIC INDEX	4.10	5.16	4.29	4.34	4.50		4.47	0.47
EPT RICHNESS	22	22	22	20	27		21.5	1.0
% R.A. DOMINANT	19%	23%	11%	15%	13%		17%	5.3%
% R.A. FILTERERS	9%	12%	22%	8%	13%		13%	7%
METALS TOLERANCE	3.21	5.27	4.04	4.50	4.34		4.26	0.86
Baetidae/Ephemeroptera	0.34	0.42	0.31	0.46	0.38		0.38	0.07
Hydropsychinae/Trichoptera	0.45	0.12	0.26	0.26	0.23		0.27	0.14
EPT / (EPT + CHIR.)	0.44	0.29	0.44	0.40	0.39		0.39	0.07

B.19 MACROINVERTEBRATE DATA
CLARK FORK RIVER at Turah - STATION 13 - 13 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S.D.
COLEOPTERA						2%	27	
Optioservus spp.	10	8	21	25	64	1%	16.0	8.3
Zaitzevia sp.	6	9	17	12	44	1%	11.0	4.7
Ordobrevia sp.	0	0	0	1	1	0%	0.3	0.5
DIPTERA						37%	416	
Pagastia sp	3	1	10	26	40	1%	10.0	11.3
Cardiocladius spp.	1	4	5	5	15	0%	3.8	1.9
Corynoneura sp	1	2	1	0	4	0%	1.0	0.8
Cricotopus spp.	18	38	57	44	157	4%	39.3	16.2
Eukiefferiella spp.	8	7	23	12	50	1%	12.5	7.3
Orthocladius spp.	32	156	359	197	744	17%	186.0	135.0
Parametriocnemus sp.	0	0	5	6	11	0%	2.8	3.2
Tvetenia sp.	7	10	43	22	82	2%	20.5	16.3
Demicryptochironomus sp.	0	1	0	0	1	0%	0.3	0.5
Microtendipes sp	0	0	0	13	13	0%	3.3	6.5
Phaenopsectra sp	0	0	0	1	1	0%	0.3	0.5
Polypedilum spp.	15	19	257	30	321	7%	80.3	118.0
Rheotanytarsus sp.	11	7	14	5	37	1%	9.3	4.0
Micropsectra spp.	20	4	0	1	25	1%	6.3	9.3
Antocha sp.	6	0	18	44	68	2%	17.0	19.5
Hexatoma sp.	4	3	0	4	11	0%	2.8	1.9
Atherix pachypus	0	0	0	1	1	0%	0.3	0.5
Simulium spp.	3	35	7	31	76	2%	19.0	16.3
Chelifera sp.	3	3	0	0	6	0%	1.5	1.7
Protanyderus sp.	0	1	0	0	1	0%	0.3	0.5
EPHEMEROPTERA						29%	322	
Acentrella insignificans	18	21	56	8	103	2%	25.8	20.9
Baetis tricaudatus	11	22	125	39	197	4%	49.3	51.8
Diphetor hageni	2	0	17	10	29	1%	7.3	7.8
Attenella margarita	9	16	52	38	115	3%	28.8	19.8
Serratella tibialis	131	83	120	92	426	10%	106.5	22.7
Ephemerella inermis	0	1	10	0	11	0%	2.8	4.9
Drunella doddsi	0	1	0	0	1	0%	0.3	0.5
Drunella grandis	9	7	26	38	80	2%	20.0	14.7
Timpango hecuba	0	0	1	0	1	0%	0.3	0.5
Epeorus albertae	1	1	1	0	3	0%	0.8	0.5
Nixe sp.	0	4	1	3	8	0%	2.0	1.8
Rhithrogena sp.	30	23	11	5	69	2%	17.3	11.3
Tricorythodes minutus	14	14	138	77	243	5%	60.8	59.4

B.19 MACROINVERTEBRATE DATA

CLARK FORK RIVER at Turah - STATION 13 - 13 AUG 99

.

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
HEMIPTERA								
Sigara sp.	0	0	1	0	1	0%	0.3	0.5
LEPIDOPTERA								
Petrophila sp.	1	0	0	0	1	0%	0.3	0.5
PLECOPTERA						2%	20	
Claassenia sabulosa	4	5	1	0	10	0%	2.5	2.4
Hesperoperla pacifica	0	0	3	6	9	0%	2.3	2.9
Isogenoides sp.	14	15	2	1	32	1%	8.0	7.5
Skwala sp.	3	4	2	2	11	0%	2.8	1.0
Isoperla sp.	0	0	3	0	3	0%	0.8	1.5
Pteronarcella badia	1	1	2	0	4	0%	1.0	0.8
Pteronarcys californica	0	1	3	0	4	0%	1.0	1.4
Chloroperlinae	6	1	0	0	7	0%	1.8	2.9
TRICHOPTERA						29%	326	
Arctopsyche grandis	13	21	33	16	83	2%	20.8	8.8
Cheumatopsyche spp.	3	1	10	10	24	1%	6.0	4.7
Hydropsyche occidentalis	39	64	247	161	511	11%	127.8	95.3
Hydropsyche (C) cockerelli	46	30	104	67	247	6%	61.8	32.0
Hydroptila spp.	6	12	65	115	198	4%	49.5	51.1
Neotrichia sp.	1	0	0	5	6	0%	1.5	2.4
Ochrotrichia sp.	0	0	16	1	17	0%	4.3	7.8
Oecetis sp.	1	1	1	10	13	0%	3.3	4.5
Brachycentrus occidentalis	13	19	34	67	133	3%	33.3	24.2
Glossosoma sp.	24	26	8	12	70	2%	17.5	8.9
CRUSTACEA								
Pacifasticus sp.	0	0	0	1	1	0%	0.3	0.5
ID's by D. McGuire								
TOTAL ORGANISMS	548	702	1930	1264	4444		1111	627
TAXA RICHNESS	40	42	43	42	57		41.8	1.3
SHAN. DIVERSITY	4.33	4.23	4.06	4.34	4.42		4.24	0.13
BIOTIC INDEX	3.41	4.27	4.73	4.44	4.41		4.21	0.57
EPT RICHNESS	23	25	28	22	31		24.5	2.6
% R.A. DOMINANT	24%	22%	19%	16%	17%		20%	3.7%
% R.A. FILTERERS	23%	25%	23%	28%	25%		25%	2%
METALS TOLERANCE	3.32	3.94	4.14	4.18	4.02		3.89	0.40
Baetidae/Ephemeroptera	0.14	0.22	0.35	0.18	0.26		0.22	0.09
Hydropsychinae/Trichoptera	0.60	0.55	0.70	0.51	0.60		0.59	0.08
EPT / (EPT + CHIR.)	0.77	0.61	0.59	0.68	0.64		0.66	0.08

B.20 M A C R O I N V E R T E B R A T E D A T A

BLACKFOOT RIVER near mouth - STATION 14 - 11 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						9%	24	
Optioservus spp.	14	31	20	7	72	7%	18.0	10.2
Zaitzevia sp.	3	4	14	3	24	2%	6.0	5.4
Narpus concolor	0	1	0	0	1	0%	0.3	0.5
DIPTERA						28%	75	
Thienemannimyia gp.	0	0	0	3	3	0%	0.8	1.5
Pagastia sp	0	1	0	1	2	0%	0.5	0.6
Cricotopus spp.	1	2	0	2	5	0%	1.3	1.0
Stratiumyiidae	0	0	1	0	1	0%	0.3	0.5
Eukiefferiella spp.	2	1	4	0	7	1%	1.8	1.7
Orthocladius spp.	2	2	2	1	7	1%	1.8	0.5
Tvetenia sp.	3	2	5	1	11	1%	2.8	1.7
Microtendipes sp	0	20	1	26	47	4%	11.8	13.2
Polypedilum spp.	4	5	4	10	23	2%	5.8	2.9
Rheotanytarsus sp.	0	3	0	2	5	0%	1.3	1.5
Micropsectra spp.	19	61	30	48	158	15%	39.5	18.7
Antocha sp.	5	2	2	2	11	1%	2.8	1.5
Hexatoma sp.	1	1	3	3	8	1%	2.0	1.2
Simulium spp.	0	0	4	2	6	1%	1.5	1.9
Chelifera sp.	4	0	0	0	4	0%	1.0	2.0
Protanyderus sp.	0	2	0	0	2	0%	0.5	1.0
EPHEMEROPTERA						16%	42	
Acentrella insignificans	5	4	12	7	28	3%	7.0	3.6
Baetis tricaudatus	5	1	13	0	19	2%	4.8	5.9
Diphetor hageni	1	0	0	0	1	0%	0.3	0.5
Attenella margarita	1	0	1	5	7	1%	1.8	2.2
Serratella tibialis	2	27	30	7	66	6%	16.5	14.1
Drunella doddsi	1	0	3	0	4	0%	1.0	1.4
Drunella grandis	1	3	4	2	10	1%	2.5	1.3
Epeorus albertae	8	6	1	3	18	2%	4.5	3.1
Nixe sp.	0	0	0	2	2	0%	0.5	1.0
Rhithrogena sp.	0	0	0	2	2	0%	0.5	1.0
Paraleptophlebia sp.	0	0	0	2	2	0%	0.5	1.0
Tricorythodes minutus	0	0	0	7	7	1%	1.8	3.5
PLECOPTERA						3%	9	
Claassenia sabulosa	9	6	2	2	19	2%	4.8	3.4
Pteronarcys californica	2	1	5	0	8	1%	2.0	2.2
Calineuria	3	1	0	0	4	0%	1.0	1.4
Chloroperlinae	1	0	0	2	3	0%	0.8	1.0

BLACKFOOT RIVER near mouth - STATION 14 - 11 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TRICHOPTERA						42%	112	
Arctopsyche grandis	7	4	5	2	18	2%	4.5	2.1
Cheumatopsyche spp.	6	4	8	5	23	2%	5.8	1.7
Hydropsyche (C) cockerelli	27	14	85	16	142	13%	35.5	33.5
Hydropsyche oslari ?	5	2	18	2	27	3%	6.8	7.6
Hydropsyche slossonae	5	1	29	3	38	4%	9.5	13.1
Hydroptila spp.	0	1	0	1	2	0%	0.5	0.6
Lepidostoma sp.	0	2	1	0	3	0%	0.8	1.0
Ceraclea sp.	0	1	0	1	2	0%	0.5	0.6
Oecetis sp.	0	0	0	1	1	0%	0.3	0.5
Wormaldia sp.	1	1	2	0	4	0%	1.0	0.8
Brachycentrus occidentalis	21	12	43	3	79	7%	19.8	17.2
Rhyacophilaangelita gp.	2	8	3	1	14	1%	3.5	3.1
Helicopsyche borealis	0	1	1	0	2	0%	0.5	0.6
Glossosoma sp.	19	25	33	17	94	9%	23.5	7.2
ANNELIDA						0%	1	
Lumbriculidae	0	1	0	3	4	0%	1.0	1.4
Tubificidae	0	0	0	1	1	0%	0.3	0.5
MOLLUSCA						2%	4	
Physella sp.	0	0	0	17	17	2%	4.3	8.5
OTHER								
Turbellaria	0	0	0	2	2	0%	0.5	1.0
ID's by D. McGuire								
TOTAL ORGANISMS	190	264	389	227	1070		268	86
TAXA RICHNESS	32	37	32	40	53		35.3	3.9
SHAN. DIVERSITY	4.30	4.01	3.98	4.36	4.50		4.16	0.19
BIOTIC INDEX	3.25	3.44	3.23	4.17	3.48		3.52	0.44
EPT RICHNESS	21	21	20	22	30		21.0	0.8
% R.A. DOMINANT	14%	23%	22%	21%	15%		20%	4.0%
% R.A. FILTERERS	38%	16%	50%	15%	32%		30%	17%
METALS TOLERANCE	3.19	2.67	3.56	2.96	3.15		3.10	0.38
Baetidae/Ephemeroptera	0.46	0.12	0.39	0.19	0.29		0.29	0.16
Hydropsychinae/Trichoptera	0.46	0.28	0.61	0.50	0.51		0.46	0.14
EPT / (EPT + CHIR.)	0.81	0.56	0.86	0.50	0.71		0.68	0.18

B.21	MACROINVERTEBRATE DATA							
CLARK FORK RIVER above Missoula - STATION 15.5 - 11 AUG 99								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						5%	20	
Optioservus spp.	0	11	15	5	31	2%	7.8	6.6
Zaitzevia sp.	4	10	29	4	47	3%	11.8	11.8
DIPTERA						28%	115	
Pagastia sp	2	0	4	0	6	0%	1.5	1.9
Cardiocladius spp.	4	4	1	2	11	1%	2.8	1.5
Corynoneura sp	0	0	2	0	2	0%	0.5	1.0
Cricotopus spp.	0	0	21	0	21	1%	5.3	10.5
Cricotopus nostococladius	0	14	5	0	19	1%	4.8	6.6
Eukiefferiella spp.	0	1	3	0	4	0%	1.0	1.4
Orthocladius spp.	17	15	19	8	59	4%	14.8	4.8
Parametriocnemus sp.	0	0	2	0	2	0%	0.5	1.0
Thienemanniella sp.	0	0	1	0	1	0%	0.3	0.5
Tvetenia sp.	3	1	12	1	17	1%	4.3	5.3
Microtendipes sp	0	0	17	0	17	1%	4.3	8.5
Polypedilum spp.	3	5	22	2	32	2%	8.0	9.4
Rheotanytarsus sp.	0	1	1	1	3	0%	0.8	0.5
Micropsectra spp.	0	2	12	5	19	1%	4.8	5.3
Antocha sp.	23	32	30	24	109	7%	27.3	4.4
Simulium spp.	90	14	1	19	124	8%	31.0	40.1
Chelifera sp.	0	5	7	0	12	1%	3.0	3.6
EPHEMEROPTERA						20%	82	
Acentrella insignificans	2	15	31	2	50	3%	12.5	13.8
Baetis tricaudatus	2	20	11	8	41	2%	10.3	7.5
Diphetor hageni	0	2	14	0	16	1%	4.0	6.7
Attenella margarita	0	7	14	0	21	1%	5.3	6.7
Serratella tibialis	17	46	14	24	101	6%	25.3	14.5
Ephemerella inermis	1	0	0	0	1	0%	0.3	0.5
Drunella doddsi	0	0	0	1	1	0%	0.3	0.5
Drunella grandis	1	11	5	8	25	2%	6.3	4.3
Epeorus albertae	4	8	5	9	26	2%	6.5	2.4
Heptagenia sp.	1	1	0	0	2	0%	0.5	0.6
Nixe sp.	0	1	4	1	6	0%	1.5	1.7
Rhithrogena sp.	4	16	1	2	23	1%	5.8	6.9
Tricorythodes minutus	4	0	8	1	13	1%	3.3	3.6
LEPIDOPTERA								
Petrophila sp.	0	0	1	0	1	0%	0.3	0.5

B.21   M A C R O I N V E R T E B R A T E   D A T A

CLARK FORK RIVER above Missoula - STATION 15.5 - 11 AUG 99

.

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
PLECOPTERA						3%	12	
Claassenia sabulosa	1	3	5	2	11	1%	2.8	1.7
Hesperoperla pacifica	0	3	1	0	4	0%	1.0	1.4
Isogenoides sp.	15	0	0	1	16	1%	4.0	7.3
Skwala sp.	0	2	0	0	2	0%	0.5	1.0
Pteronarcys californica	2	5	6	2	15	1%	3.8	2.1
Chloroperlinae	0	0	1	0	1	0%	0.3	0.5
TRICHOPTERA						41%	167	
Arctopsyche grandis	10	13	5	7	35	2%	8.8	3.5
Cheumatopsyche spp.	14	33	41	11	99	6%	24.8	14.6
Hydropsyche occidentalis	14	21	22	17	74	5%	18.5	3.7
Hydropsyche (C) cockerelli	29	65	60	36	190	12%	47.5	17.7
Hydroptila spp.	5	1	3	1	10	1%	2.5	1.9
Neotrichia sp.	1	1	5	0	7	0%	1.8	2.2
Oecetis sp.	0	0	3	0	3	0%	0.8	1.5
Psychomyia flavida	1	0	5	0	6	0%	1.5	2.4
Brachycentrus occidentalis	30	107	73	23	233	14%	58.3	39.3
Rhyacophila sp.	1	0	1	0	2	0%	0.5	0.6
Glossosoma sp.	1	4	5	0	10	1%	2.5	2.4
ANNELIDA						0%	1	
Naididae	1	0	1	0	2	0%	0.5	0.6
Tubificidae	0	0	1	0	1	0%	0.3	0.5
OTHER								
Turbellaria	0	1	53	5	59	4%	14.8	25.6
ID's by D. McGuire								
TOTAL ORGANISMS	307	501	603	232	1643		411	171
TAXA RICHNESS	31	36	48	29	53		36.0	8.5
SHAN. DIVERSITY	3.76	4.12	4.69	4.09	4.62		4.17	0.39
BIOTIC INDEX	4.22	3.35	4.08	3.63	3.82		3.82	0.40
EPT RICHNESS	22	22	25	18	30		21.8	2.9
% R.A. DOMINANT	29%	21%	12%	16%	14%		20%	7.5%
% R.A. FILTERERS	61%	51%	34%	49%	46%		49%	11%
METALS TOLERANCE	4.24	3.55	3.97	3.61	3.84		3.84	0.33
Baetidae/Ephemeroptera	0.11	0.29	0.52	0.18	0.33		0.28	0.18
Hydropsychinae/Trichoptera	0.54	0.49	0.55	0.67	0.54		0.56	0.08
EPT / (EPT + CHIR.)	0.85	0.90	0.74	0.89	0.83		0.84	0.07

B.22 MACROINVERTEBRATE DATA
CLARK FORK RIVER at Shuffields - STATION 18 - 11 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S.D.
COLEOPTERA						1%	15	
Optioservus spp.	1	4	0	8	13	0%	3.3	3.6
Zaitzevia sp.	0	13	3	27	43	1%	10.8	12.2
Ordobrevia sp.	0	1	0	2	3	0%	0.8	1.0
DIPTERA						25%	318	
Thienemannimyia gp.	5	0	0	6	11	0%	2.8	3.2
Pagastia sp	0	5	0	0	5	0%	1.3	2.5
Potthastia spp.	12	1	2	0	15	0%	3.8	5.6
Cardiocladius spp.	2	4	20	26	52	1%	13.0	11.8
Corynoneura sp	1	1	0	0	2	0%	0.5	0.6
Cricotopus spp.	139	26	60	99	324	6%	81.0	48.8
Cricotopus nostococladius	0	2	1	0	3	0%	0.8	1.0
Eukiefferiella spp.	1	0	2	1	4	0%	1.0	0.8
Orthocladius spp.	26	26	13	137	202	4%	50.5	58.0
Synorthocladius sp.	1	0	5	1	7	0%	1.8	2.2
Tvetenia sp.	5	6	7	16	34	1%	8.5	5.1
Cryptochironomus sp.	0	0	0	5	5	0%	1.3	2.5
Microtendipes sp	12	17	2	0	31	1%	7.8	8.1
Phaenopsectra sp	0	8	0	0	8	0%	2.0	4.0
Polypedilum spp.	95	83	50	142	370	7%	92.5	38.1
Cladotanytarsus sp.	2	6	7	3	18	0%	4.5	2.4
Rheotanytarsus sp.	12	7	20	20	59	1%	14.8	6.4
Micropsectra spp.	0	9	0	5	14	0%	3.5	4.4
Antocha sp.	8	10	10	6	34	1%	8.5	1.9
Atherix pachypus	6	23	6	9	44	1%	11.0	8.1
Simulium spp.	0	0	2	23	25	0%	6.3	11.2
Chelifera sp.	0	1	1	2	4	0%	1.0	0.8
EPHEMEROPTERA						17%	212	
Acentrella insignificans	103	14	55	85	257	5%	64.3	38.9
Baetis tricaudatus	2	7	5	39	53	1%	13.3	17.3
Centroptilum sp.	5	0	0	0	5	0%	1.3	2.5
Diphetor hageni	0	3	3	7	13	0%	3.3	2.9
Attenella margarita	21	39	19	30	109	2%	27.3	9.2
Serratella tibialis	0	10	2	8	20	0%	5.0	4.8
Ephemerella inermis	0	0	0	1	1	0%	0.3	0.5
Drunella grandis	0	0	0	4	4	0%	1.0	2.0
Timpango hecuba	0	0	0	2	2	0%	0.5	1.0
Epeorus albertae	4	1	5	2	12	0%	3.0	1.8
Heptagenia sp.	0	0	14	0	14	0%	3.5	7.0
Nixe sp.	6	1	2	0	9	0%	2.3	2.6
Paraleptophlebia bicornuta	10	3	1	5	19	0%	4.8	3.9

B.22   M A C R O I N V E R T E B R A T E   D A T A

CLARK FORK RIVER at Shuffields - STATION 18 - 11 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
Tricorythodes minutus	45	141	17	127	330	6%	82.5	60.8
LEPIDOPTERA								
Petrophila sp.	0	1	1	0	2	0%	0.5	0.6
PLECOPTERA						1%	10	
Claassenia sabulosa	0	1	0	0	1	0%	0.3	0.5
Hesperoperla pacifica	2	2	1	1	6	0%	1.5	0.6
Isogenoides sp.	3	8	7	3	21	0%	5.3	2.6
Skwala sp.	2	0	4	5	11	0%	2.8	2.2
Pteronarcys californica	0	1	0	0	1	0%	0.3	0.5
TRICHOPTERA						56%	712	
Arctopsyche grandis	16	9	19	42	86	2%	21.5	14.3
Cheumatopsyche spp.	56	80	40	74	250	5%	62.5	18.1
Hydropsyche occidentalis	62	98	106	289	555	11%	138.8	102.0
Hydropsyche (C) cockerelli	44	45	79	116	284	6%	71.0	34.1
Hydroptila spp.	328	321	363	490	1502	30%	375.5	78.5
Neotrichia sp.	2	0	1	0	3	0%	0.8	1.0
Ochrotrichia sp.	0	0	0	1	1	0%	0.3	0.5
Lepidostoma sp.	0	0	0	5	5	0%	1.3	2.5
Ceraclea sp.	0	0	0	5	5	0%	1.3	2.5
Oecetis sp.	1	20	5	11	37	1%	9.3	8.3
Wormaldia sp.	0	0	0	1	1	0%	0.3	0.5
Psychomyia flavida	2	2	4	11	19	0%	4.8	4.3
Brachycentrus occidentalis	19	14	23	30	86	2%	21.5	6.8
Glossosoma sp.	1	0	1	11	13	0%	3.3	5.2
ANNELIDA						0%	4	
Tubificidae	0	1	0	16	17	0%	4.3	7.8
ID's by D. McGuire								
TOTAL ORGANISMS	1062	1075	988	1959	5084		1271	460
TAXA RICHNESS	37	43	41	47	60		42.0	4.2
SHAN. DIVERSITY	3.59	3.78	3.61	3.94	3.93		3.73	0.17
BIOTIC INDEX	5.24	5.04	5.14	5.12	5.13		5.13	0.08
EPT RICHNESS	21	21	23	27	33		23.0	2.8
% R.A. DOMINANT	31%	30%	37%	25%	30%		31%	4.8%
% R.A. FILTERERS	20%	24%	29%	30%	26%		26%	5%
METALS TOLERANCE	4.69	4.14	4.31	4.40	4.39		4.38	0.23
Baetidae/Ephemeroptera	0.56	0.11	0.51	0.42	0.39		0.40	0.20
Hydropsychinae/Trichoptera	0.31	0.38	0.35	0.44	0.38		0.37	0.06
EPT / (EPT + CHIR.)	0.70	0.80	0.80	0.75	0.76		0.77	0.05

B.23	MACROINVERTEBRATE DATA							
BITTERROOT RIVER near mouth - STATION 19 - 11 AUG 99								
.								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						6%	27	
Optioservus spp.	6	33	6	21	66	4%	16.5	13.1
Zaitzevia sp.	5	25	3	6	39	2%	9.8	10.2
Narpus concolor	0	1	0	0	1	0%	0.3	0.5
DIPTERA						28%	117	
Thienemannimyia gp.	1	5	0	0	6	0%	1.5	2.4
Pagastia sp	0	2	0	1	3	0%	0.8	1.0
Brillia sp.	0	1	0	0	1	0%	0.3	0.5
Cardiocladius spp.	6	0	8	4	18	1%	4.5	3.4
Corynoneura sp	0	0	0	1	1	0%	0.3	0.5
Cricotopus spp.	1	5	1	2	9	1%	2.3	1.9
Eukiefferiella spp.	1	3	1	7	12	1%	3.0	2.8
Orthocladius spp.	1	0	0	3	4	0%	1.0	1.4
Tvetenia sp.	1	11	2	5	19	1%	4.8	4.5
Microtendipes sp	1	11	0	0	12	1%	3.0	5.4
Polypedilum spp.	2	36	1	11	50	3%	12.5	16.3
Rheotanytarsus sp.	24	39	0	30	93	5%	23.3	16.7
Micropsectra spp.	0	2	0	1	3	0%	0.8	1.0
Antocha sp.	4	26	0	11	41	2%	10.3	11.4
Simulium spp.	14	37	121	13	185	11%	46.3	51.1
Limnophora sp.	0	0	0	0	0	0%	0.0	0.0
Chelifera sp.	0	2	1	8	11	1%	2.8	3.6
EPHEMEROPTERA						12%	53	
Acentrella insignificans	3	2	1	1	7	0%	1.8	1.0
Baetis tricaudatus	4	11	1	4	20	1%	5.0	4.2
Attenella margarita	5	35	2	1	43	3%	10.8	16.3
Serratella tibialis	24	20	4	24	72	4%	18.0	9.5
Drunella grandis	12	5	15	8	40	2%	10.0	4.4
Epeorus albertae	2	5	0	0	7	0%	1.8	2.4
Heptagenia sp.	0	1	0	0	1	0%	0.3	0.5
Rhithrogena sp.	1	0	12	1	14	1%	3.5	5.7
Paraleptophlebia sp.	0	2	0	0	2	0%	0.5	1.0
Tricorythodes minutus	0	4	0	0	4	0%	1.0	2.0
LEPIDOPTERA								
Petrophila sp.	2	3	3	1	9	1%	2.3	1.0

B.23   MACROINVERTEBRATE   DATA

BITTERROOT RIVER near mouth - STATION 19 - 11 AUG 99

.

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
PLECOPTERA						6%	27	
Claassenia sabulosa	0	1	0	1	2	0%	0.5	0.6
Hesperoperla pacifica	2	0	1	2	5	0%	1.3	1.0
Isogenoides sp.	5	3	3	6	17	1%	4.3	1.5
Skwala sp.	2	7	1	4	14	1%	3.5	2.6
Isoperla fulva	0	1	0	0	1	0%	0.3	0.5
Pteronarcys californica	1	0	0	0	1	0%	0.3	0.5
Pteronarcella badia	21	12	2	33	68	4%	17.0	13.2
TRICHOPTERA						45%	193	
Arctopsyche grandis	30	14	5	18	67	4%	16.8	10.4
Cheumatopsyche spp.	22	19	2	10	53	3%	13.3	9.1
Hydropsyche occidentalis	61	46	17	64	188	11%	47.0	21.5
Hydropsyche (C) cockerelli	28	20	16	42	106	6%	26.5	11.5
Hydroptila spp.	3	0	1	4	8	0%	2.0	1.8
Ceraclea sp.	2	1	0	0	3	0%	0.8	1.0
Oecetis sp.	0	1	1	1	3	0%	0.8	0.5
Wormaldia sp.	1	0	0	0	1	0%	0.3	0.5
Brachycentrus occidentalis	30	7	1	21	59	3%	14.8	13.2
Glossosoma sp.	67	55	60	102	284	17%	71.0	21.2
ANNELIDA						2%	7	
Lumbricidae	1	6	1	3	11	1%	2.8	2.4
Lumbriculidae	1	5	0	8	14	1%	3.5	3.7
Erpobdellidae	0	1	0	0	1	0%	0.3	0.5
ID's by D. McGuire								
TOTAL ORGANISMS	397	526	293	483	1699		425	103
TAXA RICHNESS	37	42	29	37	51		36.3	5.4
SHAN. DIVERSITY	4.08	4.57	3.05	4.13	4.41		3.96	0.64
BIOTIC INDEX	3.19	3.96	3.82	3.31	3.57		3.57	0.38
EPT RICHNESS	21	22	18	19	27		20.0	1.8
% R.A. DOMINANT	17%	10%	41%	21%	17%		22%	13%
% R.A. FILTERERS	53%	35%	55%	41%	44%		46%	10%
METALS TOLERANCE	3.28	3.56	4.36	3.40	3.59		3.65	0.49
Baetidae/Ephemeroptera	0.14	0.15	0.06	0.13	0.13		0.12	0.04
Hydropsychinae/Trichoptera	0.45	0.52	0.34	0.44	0.45		0.44	0.08
EPT / (EPT + CHIR.)	0.90	0.70	0.92	0.84	0.83		0.84	0.10

B.24	MACROINVERTEBRATE DATA							
CLARK FORK RIVER at Harper Bridge - STATION 20 - 11 AUG 99								
.								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						1%	4	
Optioservus spp.	2	3	4	4	13	1%	3.3	1.0
Zaitzevia sp.	0	2	0	0	2	0%	0.5	1.0
DIPTERA						30%	109	
Thienemannimyia gp.	0	8	0	2	10	1%	2.5	3.8
Nilotanypus sp.	0	1	0	0	1	0%	0.3	0.5
Pagastia sp	0	0	1	0	1	0%	0.3	0.5
Cardiocladius spp.	3	1	1	0	5	0%	1.3	1.3
Corynoneura sp	0	0	1	0	1	0%	0.3	0.5
Cricotopus spp.	3	7	13	5	28	2%	7.0	4.3
Eukiefferiella spp.	1	6	1	0	8	1%	2.0	2.7
Nanocladius sp.	0	3	0	0	3	0%	0.8	1.5
Orthocladius spp.	0	0	1	2	3	0%	0.8	1.0
Tvetenia sp.	1	5	4	0	10	1%	2.5	2.4
Microtendipes sp	5	13	2	1	21	1%	5.3	5.4
Polypedilum spp.	8	41	24	9	82	6%	20.5	15.5
Cladotanytarsus sp.	3	1	2	2	8	1%	2.0	0.8
Rheotanytarsus sp.	34	72	77	34	217	15%	54.3	23.5
Tanytarsus sp.	0	0	1	0	1	0%	0.3	0.5
Micropsectra spp.	4	2	0	3	9	1%	2.3	1.7
Antocha sp.	0	0	1	2	3	0%	0.8	1.0
Hexatoma sp.	3	0	3	1	7	0%	1.8	1.5
Atherix pachypus	1	4	1	1	7	0%	1.8	1.5
Simulium spp.	1	3	0	3	7	0%	1.8	1.5
Chelifera sp.	0	1	1	1	3	0%	0.8	0.5
EPHEMEROPTERA						28%	103	
Acentrella insignificans	29	19	22	16	86	6%	21.5	5.6
Baetis tricaudatus	5	3	3	5	16	1%	4.0	1.2
Attenella margarita	39	54	26	23	142	10%	35.5	14.2
Serratella tibialis	2	14	3	1	20	1%	5.0	6.1
Ephemerella inermis	0	1	0	0	1	0%	0.3	0.5
Drunella doddsi	0	0	0	1	1	0%	0.3	0.5
Drunella grandis	0	2	0	0	2	0%	0.5	1.0
Timpango hecuba	0	1	1	0	2	0%	0.5	0.6
Heptagenia sp.	2	1	1	0	4	0%	1.0	0.8
Nixe sp.	6	13	5	9	33	2%	8.3	3.6
Rhithrogena sp.	0	1	1	1	3	0%	0.8	0.5
Paraleptophlebia sp.	1	7	1	0	9	1%	2.3	3.2
Tricorythodes minutus	18	52	17	7	94	6%	23.5	19.6

B.24   M A C R O I N V E R T E B R A T E   D A T A

CLARK FORK RIVER at Harper Bridge - STATION 20 - 11 AUG 99

.

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
HEMIPTERA								
Sigara sp.	0	1	2	0	3	0%	0.8	1.0
LEPIDOPTERA								
Petrophila sp.	0	0	1	0	1	0%	0.3	0.5
PLECOPTERA						2%	9	
Claassenia sabulosa	0	1	0	0	1	0%	0.3	0.5
Amphinemura sp.	0	1	0	0	1	0%	0.3	0.5
Isogenoides sp.	6	7	3	6	22	2%	5.5	1.7
Skwala sp.	1	3	4	0	8	1%	2.0	1.8
Pteronarcella badia	0	0	1	0	1	0%	0.3	0.5
Chloroperlinae	1	0	0	0	1	0%	0.3	0.5
TRICHOPTERA						38%	139	
Arctopsyche grandis	6	11	8	9	34	2%	8.5	2.1
Cheumatopsyche spp.	25	39	26	3	93	6%	23.3	14.9
Hydropsyche occidentalis	20	77	33	36	166	11%	41.5	24.7
Hydropsyche (C) cockerelli	17	12	10	14	53	4%	13.3	3.0
Hydropsyche oslari ?	0	2	0	0	2	0%	0.5	1.0
Hydroptila spp.	16	26	37	13	92	6%	23.0	10.9
Neotrichia sp.	0	0	1	0	1	0%	0.3	0.5
Oecetis sp.	4	2	1	10	17	1%	4.3	4.0
Brachycentrus occidentalis	7	17	12	11	47	3%	11.8	4.1
Glossosoma sp.	13	13	12	11	49	3%	12.3	1.0
CRUSTACEA								
Pacifasticus sp.	0	0	0	1	1	0%	0.3	0.5
OTHER								
Porifera	0	0	0	1	1	0%	0.3	0.5
ID's by D. McGuire								
TOTAL ORGANISMS	287	553	369	248	1457		364	136
TAXA RICHNESS	32	43	41	33	56		37.3	5.6
SHAN. DIVERSITY	4.22	4.30	4.15	4.28	4.40		4.23	0.07
BIOTIC INDEX	4.26	4.46	4.71	4.41	4.48		4.46	0.19
EPT RICHNESS	19	25	22	17	29		20.8	3.5
% R.A. DOMINANT	14%	14%	21%	15%	15%		16%	3.5%
% R.A. FILTERERS	38%	42%	45%	44%	42%		42%	3%
METALS TOLERANCE	3.25	3.38	3.34	3.15	3.31		3.28	0.10
Baetidae/Ephemeroptera	0.33	0.13	0.31	0.33	0.25		0.28	0.10
Hydropsychinae/Trichoptera	0.57	0.65	0.49	0.50	0.57		0.55	0.08
EPT / (EPT + CHIR.)	0.78	0.70	0.64	0.75	0.71		0.72	0.06

B.25	MACROINVERTEBRATE				DATA			
CLARK FORK RIVER at Huson - STATION 22 - 12 AUG 99								
.								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						1%	4	
Optioservus spp.	1	0	1	3	5	0%	1.3	1.3
Zaitzevia sp.	1	0	0	0	1	0%	0.3	0.5
Oreodytes spp.	6	2	1	0	9	1%	2.3	2.6
DIPTERA						23%	71	
Thienemannimyia gp.	5	0	1	1	7	1%	1.8	2.2
Potthastia spp.	1	0	0	0	1	0%	0.3	0.5
Brillia sp.	0	1	0	1	2	0%	0.5	0.6
Cardiocladius spp.	0	1	0	2	3	0%	0.8	1.0
Cricotopus spp.	7	1	4	10	22	2%	5.5	3.9
Eukiefferiella spp.	0	1	1	2	4	0%	1.0	0.8
Orthocladius spp.	2	0	0	0	2	0%	0.5	1.0
Thienemanniella sp.	1	2	0	0	3	0%	0.8	1.0
Tvetenia sp.	4	0	0	1	5	0%	1.3	1.9
Microtendipes sp	15	6	6	7	34	3%	8.5	4.4
Phaenopsectra sp	6	0	0	0	6	0%	1.5	3.0
Polypedilum spp.	12	4	8	36	60	5%	15.0	14.4
Cladotanytarsus sp.	1	0	1	5	7	1%	1.8	2.2
Rheotanytarsus sp.	25	27	26	17	95	8%	23.8	4.6
Micropsectra spp.	6	1	0	1	8	1%	2.0	2.7
Hexatoma sp.	8	5	2	6	21	2%	5.3	2.5
Simulium spp.	1	2	1	0	4	0%	1.0	0.8
Chelifera sp.	0	0	1	0	1	0%	0.3	0.5
EPHEMEROPTERA						39%	119	
Ameletus sp.	1	0	0	0	1	0%	0.3	0.5
Acentrella insignificans	10	11	10	39	70	6%	17.5	14.3
Baetis tricaudatus	6	1	1	3	11	1%	2.8	2.4
Centroptilum sp.	5	0	0	0	5	0%	1.3	2.5
Attenella margarita	65	41	28	30	164	13%	41.0	17.0
Serratella tibialis	2	0	1	1	4	0%	1.0	0.8
Heptagenia sp.	4	0	7	4	15	1%	3.8	2.9
Nixe sp.	37	6	11	10	64	5%	16.0	14.2
Rhithrogena sp.	2	0	0	0	2	0%	0.5	1.0
Paraleptophlebia bicornuta	18	0	4	2	24	2%	6.0	8.2
Tricorythodes minutus	46	21	30	20	117	9%	29.3	12.0
HEMIPTERA								
Sigara sp.	0	2	0	0	2	0%	0.5	1.0

B.25	MACROINVERTEBRATE DATA

CLARK FORK RIVER at Huson - STATION 22 - 12 AUG 99

.

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
LEPIDOPTERA								
Petrophila sp.	1	0	0	0	1	0%	0.3	0.5
PLECOPTERA						5%	15	
Claassenia sabulosa	0	1	0	0	1	0%	0.3	0.5
Hesperoperla pacifica	1	0	0	0	1	0%	0.3	0.5
Isogenoides sp.	18	14	9	10	51	4%	12.8	4.1
Skwala sp.	2	1	3	0	6	0%	1.5	1.3
Pteronarcella badia	0	0	1	0	1	0%	0.3	0.5
Pteronarcys californica	0	0	0	1	1	0%	0.3	0.5
TRICHOPTERA						32%	98	
Arctopsyche grandis	1	1	1	1	4	0%	1.0	0.0
Cheumatopsyche spp.	16	10	8	25	59	5%	14.8	7.6
Hydropsyche occidentalis	10	3	14	32	59	5%	14.8	12.4
Hydropsyche (C) cockerelli	7	1	6	5	19	2%	4.8	2.6
Hydroptila spp.	37	67	34	55	193	16%	48.3	15.6
Leucotrichia pictipes	1	0	0	0	1	0%	0.3	0.5
Oecetis sp.	1	2	0	1	4	0%	1.0	0.8
Psychomyia flavida	0	1	0	1	2	0%	0.5	0.6
Brachycentrus occidentalis	7	2	15	7	31	3%	7.8	5.4
Glossosoma sp.	7	2	4	7	20	2%	5.0	2.4
ID's by D. McGuire								
TOTAL ORGANISMS	407	240	240	346	1233		308	83
TAXA RICHNESS	41	30	30	32	50		33.3	5.3
SHAN. DIVERSITY	4.39	3.57	4.08	4.07	4.30		4.03	0.34
BIOTIC INDEX	4.15	4.69	4.39	4.71	4.46		4.48	0.27
EPT RICHNESS	23	17	18	19	27		19.3	2.6
% R.A. DOMINANT	16%	28%	14%	16%	16%		18%	6.3%
% R.A. FILTERERS	16%	19%	30%	25%	22%		23%	6%
METALS TOLERANCE	2.92	3.16	3.15	3.72	3.24		3.24	0.34
Baetidae/Ephemeroptera	0.11	0.15	0.12	0.39	0.18		0.19	0.13
Hydropsychinae/Trichoptera	0.38	0.16	0.34	0.46	0.35		0.34	0.13
EPT / (EPT + CHIR.)	0.78	0.81	0.80	0.75	0.78		0.79	0.02

CLARK FORK RIVER near Superior - STATION 24 - 12 AUG 99

.

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						1%	10	
Optioservus spp.	4	9	8	6	27	1%	6.8	2.2
Zaitzevia sp.	2	6	2	1	11	0%	2.8	2.2
Oreodytes spp.	0	0	1	2	3	0%	0.8	1.0
DIPTERA						40%	305	
Thienemannimyia gp.	0	3	1	1	5	0%	1.3	1.3
Sympothastia sp.	0	0	0	1	1	0%	0.3	0.5
Cardiocladius spp.	4	5	1	0	10	0%	2.5	2.4
Cricotopus spp.	6	96	2	6	110	4%	27.5	45.7
Eukiefferiella spp.	4	7	2	0	13	0%	3.3	3.0
Orthocladius spp.	15	8	3	0	26	1%	6.5	6.6
Tvetenia sp.	3	15	6	4	28	1%	7.0	5.5
Microtendipes sp	1	1	8	0	10	0%	2.5	3.7
Xenochironomus sp.	0	0	0	1	1	0%	0.3	0.5
Polypedilum spp.	8	139	29	23	199	7%	49.8	60.2
Rheotanytarsus sp.	3	2	3	1	9	0%	2.3	1.0
Micropsectra spp.	1	0	6	0	7	0%	1.8	2.9
Simulium (Eusimulium)	377	389	27	8	801	26%	200.3	211.2
EPHEMEROPTERA						15%	110	
Acentrella insignificans	8	38	25	22	93	3%	23.3	12.3
Baetis tricaudatus	3	36	18	2	59	2%	14.8	15.9
Diphetor hageni	0	0	1	2	3	0%	0.8	1.0
Attenella margarita	0	1	14	32	47	2%	11.8	14.9
Serratella tibialis	15	22	47	16	100	3%	25.0	15.0
Ephemerella inermis	0	0	1	1	2	0%	0.5	0.6
Drunella coloradensis	0	0	1	0	1	0%	0.3	0.5
Drunella grandis	8	2	1	2	13	0%	3.3	3.2
Epeorus albertae	7	17	44	10	78	3%	19.5	16.9
Nixe sp.	0	1	0	3	4	0%	1.0	1.4
Rhithrogena sp.	13	15	3	1	32	1%	8.0	7.0
Paraleptophlebia bicornuta	0	0	1	3	4	0%	1.0	1.4
Tricorythodes minutus	0	1	1	2	4	0%	1.0	0.8
PLECOPTERA						2%	13	
Claassenia sabulosa	5	11	3	1	20	1%	5.0	4.3
Hesperoperla pacifica	1	0	1	0	2	0%	0.5	0.6
Isogenoides sp.	4	12	9	4	29	1%	7.3	3.9
Skwala sp.	0	0	1	1	2	0%	0.5	0.6

B.26	MACROINVERTEBRATE	DATA						
CLARK FORK RIVER near Superior - STATION 24 - 12 AUG 99								
.								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TRICHOPTERA						42%	318	
Arctopsyche grandis	8	4	7	4	23	1%	5.8	2.1
Cheumatopsyche spp.	30	81	167	55	333	11%	83.3	59.6
Hydropsyche occidentalis	49	228	78	15	370	12%	92.5	93.9
Hydropsyche (C) tana?	53	17	41	19	130	4%	32.5	17.5
Hydropsyche (C) cockerelli	57	24	53	43	177	6%	44.3	14.7
Hydroptila spp.	7	44	6	3	60	2%	15.0	19.4
Neotrichia sp.	0	0	1	0	1	0%	0.3	0.5
Oecetis sp.	0	0	0	7	7	0%	1.8	3.5
Brachycentrus occidentalis	2	1	8	5	16	1%	4.0	3.2
Rhyacophila angelita gp.	0	0	0	3	3	0%	0.8	1.5
Glossosoma sp.	25	11	59	57	152	5%	38.0	23.8
ANNELIDA						0%	1	
Lumbricidae	1	0	0	0	1	0%	0.3	0.5
Naididae	0	0	0	1	1	0%	0.3	0.5
OTHER								
Turbellaria	0	0	0	1	1	0%	0.3	0.5
ID's by D. McGuire								
TOTAL ORGANISMS	724	1246	690	369	3029		757	363
TAXA RICHNESS	30	31	39	38	47		34.5	4.7
SHAN. DIVERSITY	2.90	3.39	3.92	4.13	3.88		3.59	0.55
BIOTIC INDEX	4.52	4.99	3.92	3.61	4.47		4.26	0.62
EPT RICHNESS	17	19	25	25	28		21.5	4.1
% R.A. DOMINANT	52%	31%	24%	15%	26%		31%	16%
% R.A. FILTERERS	80%	60%	56%	41%	61%		59%	16%
METALS TOLERANCE	4.54	4.94	3.79	3.50	4.41		4.19	0.66
Baetidae/Ephemeroptera	0.20	0.56	0.28	0.27	0.35		0.33	0.16
Hydropsychinae/Trichoptera	0.82	0.85	0.81	0.63	0.79		0.78	0.10
EPT / (EPT + CHIR.)	0.87	0.67	0.91	0.89	0.81		0.84	0.11

B.27	MACROINVERTEBRATE	DATA						
CLARK FORK RIVER above Flathead - STATION 25 - 12 AUG 99								
.								
Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
COLEOPTERA						1%	2	
Optioservus spp.	1	0	0	0	1	0%	0.3	0.5
Zaitzevia sp.	0	1	4	2	7	1%	1.8	1.7
DIPTERA						33%	116	
Thienemannimyia gp.	0	0	1	4	5	0%	1.3	1.9
Pagastia sp	1	0	0	0	1	0%	0.3	0.5
Cricotopus spp.	1	3	3	5	12	1%	3.0	1.6
Eukiefferiella spp.	2	5	2	3	12	1%	3.0	1.4
Nanocladius sp.	0	0	2	1	3	0%	0.8	1.0
Orthocladius spp.	3	0	0	0	3	0%	0.8	1.5
Synorthocladius sp.	0	1	0	2	3	0%	0.8	1.0
Tvetenia sp.	4	6	2	9	21	2%	5.3	3.0
Microtendipes sp	9	13	12	14	48	3%	12.0	2.2
Phaenopsectra sp	2	1	0	0	3	0%	0.8	1.0
Polypedilum spp.	6	3	11	17	37	3%	9.3	6.1
Xenochironomus sp.	2	1	0	1	4	0%	1.0	0.8
Cladotanytarsus sp.	3	2	1	1	7	1%	1.8	1.0
Rheotanytarsus sp.	71	51	86	67	275	20%	68.8	14.4
Tanytarsus sp.	1	0	1	8	10	1%	2.5	3.7
Micropsectra spp.	1	4	2	6	13	1%	3.3	2.2
Antocha sp.	0	0	0	1	1	0%	0.3	0.5
Atherix pachypus	0	0	0	3	3	0%	0.8	1.5
Simulium (Psilozoa)	0	1	2	1	4	0%	1.0	0.8
EPHEMEROPTERA						23%	79	
Acentrella insignificans	19	22	14	9	64	5%	16.0	5.7
Baetis tricaudatus	1	0	3	0	4	0%	1.0	1.4
Centroptilum sp.	0	0	0	1	1	0%	0.3	0.5
Attenella margarita	6	3	7	10	26	2%	6.5	2.9
Serratella tibialis	4	7	5	2	18	1%	4.5	2.1
Timpango hecuba	0	0	0	1	1	0%	0.3	0.5
Epeorus albertae	38	24	11	9	82	6%	20.5	13.4
Heptagenia sp.	16	5	11	27	59	4%	14.8	9.3
Nixe sp.	1	4	2	1	8	1%	2.0	1.4
Rhithrogena sp.	0	1	1	1	3	0%	0.8	0.5
Paraleptophlebia bicornuta	7	11	10	7	35	3%	8.8	2.1
Paraleptophlebia sp.	0	1	0	10	11	1%	2.8	4.9
Tricorythodes minutus	0	1	2	0	3	0%	0.8	1.0
LEPIDOPTERA								
Petrophila sp.	0	0	1	0	1	0%	0.3	0.5

B.27 MACROINVERTEBRATE DATA

CLARK FORK RIVER above Flathead - STATION 25 - 12 AUG 99

.

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S.D.
PLECOPTERA						2%	7	
Claassenia sabulosa	0	2	1	1	4	0%	1.0	0.8
Hesperoperla pacifica	0	1	0	0	1	0%	0.3	0.5
Isogenoides sp.	5	3	7	5	20	1%	5.0	1.6
Skwala sp.	0	0	0	1	1	0%	0.3	0.5
TRICHOPTERA						41%	143	
Arctopsyche grandis	7	4	2	3	16	1%	4.0	2.2
Cheumatopsyche spp.	39	72	68	88	267	19%	66.8	20.4
Hydropsyche occidentalis	5	7	1	3	16	1%	4.0	2.6
Hydropsyche (C) tana?	0	2	0	0	2	0%	0.5	1.0
Hydropsyche (C) cockerelli	33	45	39	45	162	12%	40.5	5.7
Hydroptila spp.	22	19	26	17	84	6%	21.0	3.9
Ceraclea sp.	0	0	2	1	3	0%	0.8	1.0
Oecetis sp.	1	1	1	1	4	0%	1.0	0.0
Psychomyia flavida	0	2	1	1	4	0%	1.0	0.8
Brachycentrus occidentalis	1	2	2	3	8	1%	2.0	0.8
Glossosoma sp.	1	3	3	0	7	1%	1.8	1.5
ANNELIDA						0%	1	
Lumbriculidae	1	1	0	1	3	0%	0.8	0.5
Naididae	0	0	0	1	1	0%	0.3	0.5
MOLLUSCA						0%	1	
Fisherola nutalli	0	0	1	0	1	0%	0.3	0.5
Stagnicola sp.	0	0	2	0	2	0%	0.5	1.0
ANNELIDA						0%	1	
Porifera	1	1	1	1	4	0%	1.0	0.0
ID's by D. McGuire								
TOTAL ORGANISMS	315	336	353	395	1399		350	34
TAXA RICHNESS	33	38	39	43	55		38.3	4.1
SHAN. DIVERSITY	3.84	3.95	3.84	4.03	4.07		3.91	0.10
BIOTIC INDEX	4.54	4.51	4.78	4.68	4.63		4.63	0.13
EPT RICHNESS	17	23	22	23	28		21.3	2.9
% R.A. DOMINANT	23%	21%	24%	22%	20%		23%	1.2%
% R.A. FILTERERS	50%	55%	57%	53%	54%		54%	3%
METALS TOLERANCE	2.63	3.23	3.05	3.16	3.03		3.02	0.27
Baetidae/Ephemeroptera	0.22	0.28	0.26	0.13	0.22		0.22	0.07
Hydropsychinae/Trichoptera	0.71	0.80	0.74	0.84	0.78		0.77	0.06
EPT / (EPT+CHIR.)	0.66	0.73	0.64	0.64	0.67		0.67	0.04

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
B.28 MACROINVERTEBRATE DATA
CLARK FORK RIVER above T Falls Reservoir - STATION 27 - 12 AUG 99
COLEOPTERA						1%	2	
Optioservus spp.	0	2	0	0	2	0%	0.5	1.0
Zaitzevia sp.	2	0	2	2	6	1%	1.5	1.0
DIPTERA						22%	55	
Thienemannimyia gp.	0	0	0	1	1	0%	0.3	0.5
Pagastia sp	2	0	0	0	2	0%	0.5	1.0
Cardiocladius spp.	0	1	1	0	2	0%	0.5	0.6
Cricotopus spp.	1	3	3	8	15	1%	3.8	3.0
Eukiefferiella spp.	0	2	1	2	5	0%	1.3	1.0
Orthocladius spp.	3	4	4	4	15	1%	3.8	0.5
Symbiocladius sp.	0	2	1	0	3	0%	0.8	1.0
Tvetenia sp.	1	6	7	17	31	3%	7.8	6.7
Microtendipes sp	4	15	11	12	42	4%	10.5	4.7
Polypedilum spp.	0	3	0	2	5	0%	1.3	1.5
Stenochironomus sp.	0	0	0	1	1	0%	0.3	0.5
Cladotanytarsus sp.	5	0	0	0	5	0%	1.3	2.5
Rheotanytarsus sp.	5	24	16	34	79	8%	19.8	12.3
Micropsectra spp.	1	0	1	3	5	0%	1.3	1.3
Simulium spp.	0	2	3	4	9	1%	2.3	1.7
EPHEMEROPTERA						7%	17	
Acentrella insignificans	0	4	2	6	12	1%	3.0	2.6
Baetis tricaudatus	2	2	3	1	8	1%	2.0	0.8
Attenella margarita	0	1	0	1	2	0%	0.5	0.6
Serratella tibialis	0	0	0	1	1	0%	0.3	0.5
Drunella grandis	0	0	1	2	3	0%	0.8	1.0
Timpango hecuba	0	1	0	1	2	0%	0.5	0.6
Epeorus albertae	0	3	0	0	3	0%	0.8	1.5
Heptagenia sp.	0	3	1	1	5	0%	1.3	1.3
Nixe sp.	1	1	0	0	2	0%	0.5	0.6
Stenonema sp.	1	8	4	5	18	2%	4.5	2.9
Tricorythodes minutus	2	5	2	3	12	1%	3.0	1.4
LEPIDOPTERA								
Petrophila sp.	3	0	6	2	11	1%	2.8	2.5
PLECOPTERA						0%	0	
Claassenia sabulosa	0	0	1	0	1	0%	0.3	0.5

B.28 MACROINVERTEBRATE DATA
CLARK FORK RIVER above T Falls Reservoir - STATION 27 - 12 AUG 99

Taxon	sample1	sample2	sample3	sample4	SUM	%RA	MEAN	S. D.
TRICHOPTERA						63%	160	
Cheumatopsyche spp.	16	36	25	52	129	13%	32.3	15.5
Hydropsyche occidentalis	4	8	4	6	22	2%	5.5	1.9
Hydropsyche (C) cockerelli	34	82	67	77	260	26%	65.0	21.6
Hydropsyche (C) tana ?	1	1	2	4	8	1%	2.0	1.4
Dicosmoecus sp.	0	1	0	0	1	0%	0.3	0.5
Hydroptila spp.	9	28	29	30	96	9%	24.0	10.0
Ceraclea sp.	7	9	11	3	30	3%	7.5	3.4
Nectopsyche sp.	0	0	1	0	1	0%	0.3	0.5
Oecetis sp.	2	0	1	0	3	0%	0.8	1.0
Psychomyia flavida	1	2	5	3	11	1%	2.8	1.7
Brachycentrus occidentalis	0	3	1	1	5	0%	1.3	1.3
Protoptila sp.	0	0	0	1	1	0%	0.3	0.5
Glossosoma sp.	8	30	18	17	73	7%	18.3	9.0
ANNELIDA						1%	2	
Lumbriculidae	2	0	3	1	6	1%	1.5	1.3
Naididae	0	0	0	1	1	0%	0.3	0.5
MOLLUSCA						6%	15	
Fisherola nutalli	2	12	8	8	30	3%	7.5	4.1
Stagnicola sp.	0	0	0	1	1	0%	0.3	0.5
Radix auricularia	0	3	0	1	4	0%	1.0	1.4
Gyraulus sp.	2	1	8	3	14	1%	3.5	3.1
Ferrissia sp.	0	0	0	4	4	0%	1.0	2.0
Sphaeriidae	3	1	1	0	5	0%	1.3	1.3
OTHER								
Turbellaria	0	0	0	1	1	0%	0.3	0.5
Porifera	0	0	0	1	1	0%	0.3	0.5
ID's by D. McGuire								
TOTAL ORGANISMS	124	309	254	328	1015		254	92
TAXA RICHNESS	27	34	34	41	53		34.0	5.7
SHAN. DIVERSITY	3.90	3.87	3.96	3.97	4.09		3.92	0.05
BIOTIC INDEX	4.50	4.25	4.45	4.65	4.46		4.46	0.17
EPT RICHNESS	13	19	18	19	25		17.3	2.9
% R.A. DOMINANT	27%	27%	26%	23%	26%		26%	1.7%
% R.A. FILTERERS	51%	51%	47%	54%	51%		51%	3%
METALS TOLERANCE	3.57	3.39	3.47	3.67	3.52		3.53	0.12
Baetidae/Ephemeroptera	0.33	0.21	0.38	0.33	0.29		0.32	0.07
Hydropsychinae/Trichoptera	0.67	0.64	0.60	0.72	0.66		0.66	0.05
EPT / (EPT + CHIR.)	0.80	0.79	0.80	0.72	0.77		0.78	0.04

APPENDIX C:

Metric values and bioassessment scores for Clark Fork Basin
monitoring stations, 1986-1999

C-1. Mean metric values and bioassessment scores for Blacktail Creek above Grove Gulch: Station SF-1, August, 1993-1999 (4 Hess samples per year).

	1993	1994	1995	1996	1997	1998	1999	Mean
Metric values								
Taxa richness	30	35	31	27	23	29	31	29
Shannon diversity	1.9	3.3	3.0	3.0	3.0	3.3	3.3	3.0
EPT/EPTC	0.20	0.76	0.54	0.87	0.75	0.86	0.73	0.67
Hydropsychinae/Trichoptera	0.58	0.97	1.00	0.99	0.99	0.96	0.89	0.91
Baetidae/Ephemeroptera	0.40	0.92	0.90	0.94	0.96	0.89	0.88	0.84
Biotic index	6.3	4.3	4.1	4.1	4.5	4.2	4.5	4.6
% Filterer	67	47	57	65	66	55	49	58
Density	1648	1670	2566	1147	1173	921	1176	1472
EPT richness	10	13	10	12	9	13	12	11
Metals Tolerance index	6.6	6.0	5.5	6.0	6.0	5.5	5.5	5.9
Metric scores								
Taxa richness	4	5	4	3	2	3	4	4
Shannon diversity	2	5	5	5	5	5	5	5
EPT/EPTC	2	6	5	6	6	6	6	5
Hydropsychinae/Trichoptera	6	1	0	1	1	2	4	2
Baetidae/Ephemeroptera	6	3	4	2	2	4	4	4
Biotic index	2	5	5	5	5	5	5	5
% Filterer	2	6	4	3	2	5	6	4
Density (high)	6	6	5	6	6	6	6	6
Density (low)	6	6	6	6	6	6	6	6
EPT richness	3	3	3	3	2	3	3	3
Metals Tolerance index	3	3	4	3	3	4	4	3
Total	42	49	45	43	40	49	53	46
Organic subset	10	17	14	14	13	16	17	14
Metals subset	12	12	13	12	11	13	13	12
Bioassessment								
Overall	64%	74%	68%	65%	61%	74%	80%	69%
Organic subset	56%	94%	78%	78%	72%	89%	94%	80%
Metals subset	67%	67%	72%	67%	61%	72%	72%	68%

C-2. Mean metric values and bioassessment scores for Silver Bow Creek above the Butte WWTP: Station 00 - August, 1987-1999 (four Hess samples per year).

Metric values	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Taxa richness	5	6	6	7	9	10	8	14	10	12	17	16	17	11
Shannon diversity	1.6	2.3	0.9	1.4	1.8	1.4	1.7	1.7	1.8	2.1	2.7	2.1	1.7	1.8
EPT/EPTC	0.03	0.03	0.00	0.00	0.01	0.01	0.00	0.02	0.01	0.14	0.35	0.06	0.13	0.06
Hydropsychinae/Trichoptera	1.00	0.75	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.99	1.00	0.96	0.97
Baetidae/Ephemeroptera	1.00	1.00	1.00	1.00	0.75	1.00	1.00	1.00	1.00	1.00	1.00	0.96	1.00	0.98
Biotic index	4.9	5.1	6.6	5.7	4.9	6.3	5.0	5.7	5.4	5.2	4.5	5.6	6.3	5.5
% Filterer	0	2	1	0	0	0	1	2	1	13	34	19	22	7
Density	26	46	175	362	344	167	247	607	278	367	378	349	682	310
EPT richness	0	1	0	1	1	1	1	2	1	3	6	5	5	2
Metals Tolerance index	9.3	9.2	9.7	9.4	9.2	9.3	9.4	9.4	9.1	8.9	8.0	8.4	8.9	9.1
Metric scores														
Taxa richness	0	0	0	0	0	0	0	0	0	0	1	1	1	0
Shannon diversity	1	3	0	0	2	0	1	1	2	2	4	2	1	1
EPT/EPTC	0	0	0	0	0	0	0	0	0	1	4	1	1	1
Hydropsychinae/Trichoptera	0	6	0	0	0	0	0	0	2	0	1	0	0	1
Baetidae/Ephemeroptera	0	0	0	0	6	0	0	0	0	0	0	2	0	1
Biotic index	4	4	1	3	4	2	4	3	3	3	5	3	2	3
% Filterer	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Density (high)	*	*	*	*	*	*	*	6	*	*	*	*	6	6
Density (low)	0	0	2	4	3	2	2	6	3	4	4	3	6	6
EPT richness	0	0	0	0	0	0	0	1	0	1	2	1	3	3
Metals Tolerance index	0	0	0	0	0	0	0	0	0	1	1	1	1	0
Total	11	19	9	13	21	10	13	23	16	18	28	20	27	18
Organic subset	10	10	7	9	10	8	10	15	9	9	11	9	14	10
Metals subset	0	0	2	4	3	2	2	7	3	6	7	5	8	4
Bioassessment														
Overall	18%	32%	15%	22%	35%	17%	22%	35%	27%	30%	47%	33%	41%	29%
Organic subset	83%	83%	58%	75%	83%	67%	83%	83%	75%	75%	92%	75%	78%	78%
Metals subset	0%	0%	11%	22%	17%	11%	11%	39%	17%	33%	39%	28%	44%	21%

* not calculated if density is < 550

C-3. Mean metric values and bioassessment scores for Silver Bow Creek below the Butte WWTP: Station 01 - August, 1986-1999 (four Hess samples per year).

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Metric values															
Taxa richness	7	6	11	5	7	11	11	11	8	11	9	7	10	12	9
Shannon diversity	1.1	1.7	1.5	1.0	1.2	2.1	2.0	1.2	0.7	1.9	1.1	1.4	1.2	1.5	1.4
EPT/EPTC	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydropsychinae/Trichoptera	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Baetidae/Ephemeroptera	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
Biotic index	6.9	6.3	6.0	6.9	6.8	6.5	7.4	6.9	7.1	6.0	6.9	6.5	7.0	8.1	6.8
% Filterer	55	3	59	73	69	28	51	77	87	2	57	11	71	40	49
Density	628	118	1450	361	1763	473	315	2663	882	426	1588	306	965	1433	955
EPT richness	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0
Metals Tolerance index	8.3	9.3	7.8	7.7	7.8	8.9	7.8	7.5	7.2	8.9	8.3	9.4	7.7	6.9	8.1
Metric scores															
Taxa richness	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shannon diversity	0	1	1	0	0	2	2	0	0	2	0	1	0	1	1
EPT/EPTC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydropsychinae/Trichoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetidae/Ephemeroptera	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Biotic index	1	2	2	1	1	1	0	1	0	2	1	1	0	0	1
% Filterer	5	6	4	1	2	6	5	0	0	6	4	6	1	6	4
Density (high)	6	*	6	*	6	*	*	4	6	*	6	*	6	6	6
Density (low)	6	1	6	4	6	5	3	6	6	4	6	3	6	6	5
EPT richness	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metals Tolerance index	1	0	2	2	2	1	2	2	2	1	1	0	2	3	2
Total	25	10	21	8	17	15	12	13	14	15	18	11	15	22	18
Organic subset	12	8	12	2	9	7	5	5	6	8	11	7	7	12	10
Metals subset	7	1	8	6	8	6	5	8	8	5	7	3	8	9	6
Bioassessment															
Overall	38%	17%	32%	13%	26%	25%	20%	20%	21%	25%	27%	18%	23%	33%	24%
Organic subset	67%	67%	67%	17%	50%	58%	42%	28%	33%	67%	61%	58%	39%	67%	51%
Metals subset	39%	6%	44%	33%	44%	33%	28%	44%	44%	28%	39%	17%	44%	50%	35%

* not calculated if density is < 550

C-4. Mean metric values and bioassessment scores for Silver Bow Creek near Opportunity: Station 02.5* - August 1986-1999 (four Hess samples per year).

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Metric values															
Taxa richness	9	11	14	11	8	11	16	13	14	10	19	5	10	10	11
Shannon diversity	2.1	2.3	2.1	2.6	2.2	2.3	2.9	1.7	2.3	2.2	2.4	1.2	2.0	2.4	2.2
EPT/EPTC	0.63	0.27	0.74	0.44	0.52	0.51	0.75	0.11	0.65	0.18	0.66	0.21	0.26	0.46	0.46
Hydropsychinae/Trichoptera	0.98	0.87	0.98	0.86	0.89	0.89	0.98	0.93	0.16	0.66	0.99	0.49	0.34	0.53	0.75
Baetidae/Ephemeroptera	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	1.00	0.95	1.00	1.00	1.00	0.98
Biotic index	4.0	4.9	5.4	3.8	4.3	4.7	4.6	4.3	4.1	4.5	3.6	4.3	4.3	3.2	4.3
% Filterer	53	21	73	39	51	51	71	12	77	18	62	21	25	45	44
Density	82	120	378	189	147	220	396	399	640	157	321	176	158	115	250
EPT richness	3	3	5	5	3	4	7	4	5	3	8	3	4	3	4
Metals Tolerance index	7.0	8.0	6.7	7.5	7.4	7.5	6.0	8.6	6.2	8.3	6.8	8.1	7.8	7.1	7.3
Metric scores															
Taxa richness	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Shannon diversity	2	3	2	4	3	3	4	1	3	3	3	0	2	3	3
EPT/EPTC	6	3	6	4	5	5	6	1	6	2	6	2	3	5	4
Hydropsychinae/Trichoptera	1	5	1	5	4	4	1	3	6	6	1	6	6	6	4
Baetidae/Ephemeroptera	0	0	0	0	0	0	0	6	0	0	2	0	0	0	1
Biotic index	5	4	3	6	5	4	4	5	5	5	6	5	5	6	5
% Filterer	5	6	1	6	5	5	1	6	0	6	3	6	6	6	4
Density (high)	*	*	*	*	*	*	*	*	6	*	*	*	*	*	6
Density (low)	1	1	4	2	1	2	4	4	6	2	3	2	2	1	3
EPT richness	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1
Metals Tolerance index	2	1	3	2	2	2	3	1	3	1	3	1	2	2	2
Total	23	24	21	30	26	26	26	28	36	26	30	23	27	30	27
Organic subset	10	10	4	12	10	9	5	11	11	11	9	11	11	12	10
Metals subset	4	3	8	5	4	5	9	6	10	4	8	4	5	4	6
Bioassessment															
Overall	38%	40%	35%	50%	43%	43%	43%	47%	55%	43%	50%	38%	45%	50%	44%
Organic subset	83%	83%	33%	100%	83%	75%	42%	92%	61%	92%	75%	92%	92%	100%	79%
Metals subset	22%	17%	44%	28%	22%	28%	50%	33%	56%	22%	44%	22%	28%	22%	31%

1986- 1992 data from Station 03.

* not calculated if density is < 550

C-5. Mean metric values and bioassessment scores for Silver Bow Creek below Warm Springs Ponds: Station 04.5* - August, 1986-1999 (4 samples per year).

	1986	1987	1988	1989	1990	1991	1993	1994	1995	1996	1997	1998	1999	Mean
Metric values														
Taxa richness	16	16	18	16	13	16	29	30	27	30	33	35	36	24
Shannon diversity	2.4	1.6	2.5	2.7	2.1	1.9	3.0	3.2	2.9	2.5	2.0	2.4	3.6	2.5
EPT/EPTC	0.96	0.98	0.97	0.92	0.99	1.00	0.93	0.88	0.74	0.88	0.87	0.93	0.70	0.90
Hydropsychinae/Trichoptera	1.00	1.00	1.00	0.97	1.00	1.00	0.87	0.85	0.90	0.94	0.98	0.98	0.88	0.95
Baetidae/Ephemeroptera	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.90	0.80	0.26	0.23	0.86
Biotic index	6.3	5.1	5.8	5.9	5.0	5.1	5.5	4.8	5.4	5.1	5.2	5.2	5.5	5.4
% Filterer	66	94	75	79	93	90	32	51	58	75	79	80	27	69
Density	2558	1648	2563	2574	3223	1952	940	3018	3609	3090	3517	3345	2065	2623
EPT richness	4	5	4	6	6	5	8	12	8	13	13	13	12	8
Metals Tolerance index	5.1	5.4	5.1	5.8	5.4	5.8	4.6	5.4	6.1	5.2	5.3	5.1	4.6	5.3
Metric scores														
Taxa richness	1	1	1	1	0	1	3	4	3	4	4	5	5	3
Shannon diversity	3	1	3	4	2	2	5	5	4	3	2	3	6	3
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	0	0	0	1	0	0	5	5	4	2	1	6	6	6
Baetidae/Ephemeroptera	0	0	0	0	0	0	0	0	1	4	6	6	4	2
Biotic index	2	4	2	2	4	4	3	4	3	4	3	3	6	2
% Filterer	2	0	1	0	0	0	6	5	4	1	0	0	3	3
Density (high)	5	6	5	5	3	6	6	4	3	4	3	6	6	2
Density (low)	6	6	6	6	6	6	6	6	6	6	6	5	5	4
EPT richness	1	1	1	2	2	1	2	3	6	6	6	6	6	6
Metals Tolerance index	4	4	4	4	4	4	5	4	3	4	4	4	3	4
Total	30	29	29	31	27	30	47	46	39	41	38	40	55	37
Organic subset	9	10	8	7	7	10	15	13	10	9	6	6	14	10
Metals subset	11	11	11	12	12	11	13	13	11	13	13	13	14	12
Bioassessment														
Overall	45%	44%	44%	47%	41%	45%	71%	70%	59%	62%	58%	61%	83%	56%
Organic subset	50%	56%	39%	39%	39%	56%	83%	72%	56%	50%	33%	33%	78%	53%
Metals subset	61%	61%	61%	67%	67%	61%	72%	72%	61%	72%	72%	72%	78%	68%

* 1986-91 data from station 04.

C-6. Mean metric values and bioassessment scores for the Mill-Willow Bypass Station 05* - August, 1986-1991 and 1999 (4 samples per year).

	1986	1987	1988	1989	1990	1991	1999	Mean
Metric values								
Taxa richness	25	21	22	23		17	37	24
Shannon diversity	3.2	2.9	3.0	2.9		2.4	3.4	3.0
EPT/EPTC	0.86	0.97	0.91	0.86		0.80	0.82	0.87
Hydropsychinae/Trichoptera	0.96	0.88	0.85	0.92		0.98	0.20	0.80
Baetidae/Ephemeroptera	0.98	1.00	1.00	0.96		0.97	0.33	0.87
Biotic index	4.6	4.7	4.3	5.2		5.6	3.8	4.7
% Filterer	63	74	63	72		67	13	59
Density	357	822	869	1376		408	762	766
EPT richness	11	10	8	10		7	22	11
Metals Tolerance index	5.2	5.1	5.3	5.6		6.8	4.1	5.4
Metric scores								
Taxa richness	3	2	2	2		1	5	3
Shannon diversity	5	4	5	4		3	6	5
EPT/EPTC	6	6	6	6		6	6	6
Hydropsychinae/Trichoptera	2	4	5	3		1	6	4
Baetidae/Ephemeroptera	1	0	0	2		1	6	2
Biotic index	4	4	5	3		3	6	4
% Filterer	3	1	3	1		2	6	3
Density (high)	*	6	6	6		*	6	6
Density (low)	4	6	6	6		4	6	5
EPT richness	3	3	2	3		2	6	3
Metals Tolerance index	4	4	4	4		3	5	4
Total	35	40	44	40		26	64	42
Organic subset	7	11	14	10		5	18	11
Metals subset	11	13	12	13		9	17	13
Bioassessment								
Overall	58%	61%	67%	61%		43%	97%	64%
Organic subset	58%	61%	78%	56%		42%	100%	66%
Metals subset	61%	72%	67%	72%		50%	94%	69%

* 1999 data from reconstructed channel (MW-2).

C-7. Mean metric values and bioassessment scores for Warm Springs Creek near mouth: Station 06 - August, 1986-1999 (4 Hess samples per year).

	1986	1987	1988	1989	1990	1991	1993	1994	1995	1996	1997	1998	1999	Mean
Metric values														
Taxa richness	17	24	26	27	29	30	30	32	30	34	31	35	38	29
Shannon diversity	3.3	3.6	3.8	3.5	3.6	3.5	3.1	3.8	3.5	3.9	3.8	3.7	3.9	3.6
EPT/EPTC	0.91	0.66	0.78	0.75	0.60	0.85	0.32	0.64	0.33	0.74	0.79	0.77	0.56	0.67
Hydropsychinae/Trichoptera	0.82	0.69	0.23	0.58	0.86	0.87	0.10	0.75	0.08	0.40	0.16	0.13	0.34	0.46
Baetidae/Ephemeroptera	0.97	0.64	0.12	0.92	0.90	0.53	0.88	0.83	0.92	0.82	0.65	0.88	0.78	0.76
Biotic index	3.7	4.1	5.2	4.5	4.8	4.2	4.2	4.0	4.2	4.1	3.4	3.6	4.2	4.2
% Filterer	20	20	9	20	26	49	34	40	21	39	38	33	32	29
Density	122	277	255	620	486	581	492	759	441	526	349	415	566	453
EPT richness	10	11	13	13	13	14	12	15	13	18	18	21	23	15
Metals Tolerance index	4.5	5.1	3.8	5.2	5.6	4.9	4.5	4.1	4.3	4.4	3.8	3.7	4.2	4.5
Metric scores														
Taxa richness	1	2	3	3	3	4	4	4	4	4	4	5	5	4
Shannon diversity	5	6	6	6	6	6	5	6	6	6	6	6	6	6
EPT/EPTC	6	6	6	6	6	6	3	6	3	6	6	6	6	6
Hydropsychinae/Trichoptera	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Baetidae/Ephemeroptera	1	6	6	3	4	6	4	6	3	6	6	4	6	5
Biotic index	6	5	3	5	4	5	5	5	5	5	6	6	5	5
% Filterer	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Density (high)	*	*	*	6	*	6	*	6	*	*	*	*	6	6
Density (low)	1	3	3	6	5	6	5	6	4	5	3	4	6	4
EPT richness	3	3	3	3	3	4	3	4	3	5	5	6	6	4
Metals Tolerance index	5	4	6	4	4	5	5	5	5	5	6	6	5	5
Total	40	47	48	54	47	60	46	60	45	54	54	55	63	52
Organic subset	12	11	9	17	10	17	11	17	11	11	12	12	17	13
Metals subset	9	10	12	13	12	15	13	15	12	15	14	16	17	13
Bioassessment														
Overall	67%	78%	80%	82%	78%	91%	77%	91%	75%	90%	90%	92%	95%	84%
Organic subset	100%	92%	75%	94%	83%	94%	92%	94%	92%	92%	100%	100%	94%	93%
Metals subset	50%	56%	67%	72%	67%	83%	72%	83%	67%	83%	78%	89%	94%	74%

* not calculated if density is < 550   not sampled in 1992

C-8. Mean metric values and bioassessment scores for Clark Fork River below Warm Springs Creek: Station 07 - August, 1986-1999 (4 Hess samples per year).

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Metric values															
Taxa richness	25	24	25	23	22	24	25	36	37	35	43	44	47	48	33
Shannon diversity	2.9	2.7	1.5	2.5	2.3	2.4	2.6	3.6	3.2	3.6	2.9	4.0	3.0	4.2	2.9
EPT/EPTC	0.97	0.95	0.98	0.93	0.91	0.94	0.94	0.61	0.85	0.64	0.83	0.60	0.86	0.63	0.83
Hydropsychinae/Trichoptera	1.00	0.90	0.96	0.98	0.99	0.99	0.96	0.95	0.89	0.72	0.95	0.74	0.87	0.55	0.89
Baetidae/Ephemeroptera	1.00	1.00	1.00	1.00	0.99	0.86	1.00	0.46	0.90	0.80	0.84	0.26	0.45	0.15	0.77
Biotic index	4.7	4.7	4.1	4.7	5.0	4.8	4.9	5.2	4.5	5.0	4.9	4.6	4.6	4.6	4.7
% Filterer	65	64	81	58	75	62	54	25	41	27	57	27	62	16	51
Density	847	959	2874	1151	2402	1397	1353	852	2894	2152	2783	940	2439	1493	1753
EPT richness	10	10	11	10	11	11	12	15	15	16	20	22	22	21	15
Metals Tolerance index	5.0	5.0	4.9	5.0	5.2	5.3	5.0	4.6	4.6	5.6	5.1	5.4	4.8	4.9	5.0
Metric scores															
Taxa richness	3	2	3	2	2	2	3	5	5	5	6	6	6	6	4
Shannon diversity	4	4	1	3	3	3	4	6	5	6	4	6	5	6	4
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	0	4	2	1	1	1	2	2	4	6	2	6	5	6	3
Baetidae/Ephemeroptera	0	0	0	0	1	5	0	6	4	6	6	6	6	6	3
Biotic index	4	4	5	4	4	4	4	3	5	4	4	4	4	4	4
% Filterer	3	4	0	4	1	3	5	6	6	6	4	6	3	6	4
Density (high)	6	6	4	6	5	6	6	6	4	5	4	6	5	6	5
Density (low)	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
EPT richness	3	3	3	3	3	3	3	4	4	4	5	6	6	5	4
Metals Tolerance index	4	4	5	4	4	4	4	5	5	4	4	4	5	5	4
Total	39	42	35	39	36	43	43	55	54	58	51	62	57	62	48
Organic subset	13	13	9	14	10	13	15	15	15	15	12	16	12	16	13
Metals subset	13	13	14	13	13	13	13	15	15	14	15	16	17	16	14
Bioassessment															
Overall	59%	64%	53%	59%	55%	65%	65%	83%	82%	88%	77%	94%	86%	94%	73%
Organic subset	72%	72%	50%	78%	56%	72%	83%	83%	83%	83%	67%	89%	67%	89%	75%
Metals subset	72%	72%	78%	72%	72%	72%	72%	83%	83%	78%	83%	89%	94%	89%	79%

C-9. Mean metric values and bioassessment scores for Clark Fork River at Dempsey: Station 08 - August, 1986-1992 and 1998-1999 (four Hess samples per year).

	1986	1987	1988	1989	1990	1991	1992	1998	1999	Mean
Metric values										
Taxa richness	22	21	28	20	26	23	33	37	35	27
Shannon diversity	2.7	2.8	2.3	2.1	3.7	3.1	3.2	3.3	3.7	3.0
EPT/EPTC	0.99	0.84	0.82	0.90	0.86	0.84	0.94	0.76	0.77	0.86
Hydropsychinae/Trichop	0.98	0.95	0.95	0.96	0.83	0.93	0.65	0.80	0.87	0.88
Baetidae/Ephemeropter;	0.79	0.94	0.40	0.37	0.70	0.23	0.81	0.75	0.20	0.58
Biotic index	4.6	5.1	4.6	5.0	4.8	4.7	5.1	5.1	4.8	4.9
% Filterer	59	57	56	68	36	27	37	52	43	48
Density	589	924	1981	1518	1335	460	1376	2624	1975	1420
EPT richness	10	10	12	9	12	13	17	19	18	13
Metals Tolerance index	4.9	5.7	5.2	4.8	5.1	5.1	4.8	5.2	4.7	5.1
Metric scores										
Taxa richness	2	2	3	2	3	2	4	5	5	3
Shannon diversity	4	4	3	2	6	5	5	5	6	4
EPT/EPTC	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichop	1	2	2	2	6	3	6	6	5	4
Baetidae/Ephemeropter;	6	2	6	6	6	6	6	6	6	6
Biotic index	4	4	4	4	4	4	4	4	4	4
% Filterer	4	4	4	2	6	6	6	5	6	5
Density (high)	6	6	6	6	6	*	6	4	6	6
Density (low)	6	6	6	6	6	5	6	6	6	6
EPT richness	3	3	3	2	3	3	4	5	5	3
Metals Tolerance index	5	4	4	5	4	4	5	4	5	4
Total	47	43	47	43	56	44	58	56	60	51
Organic subset	14	14	14	12	16	10	16	13	16	15
Metals subset	14	13	13	13	13	12	15	15	16	14
Bioassessment										
Overall	71%	65%	71%	65%	85%	73%	88%	85%	91%	77%
Organic subset	78%	78%	78%	67%	89%	83%	89%	72%	89%	81%
Metals subset	78%	72%	72%	72%	72%	67%	83%	83%	89%	77%

* not calculated if density is < 550.

C-10. Mean metric values and bioassessment scores for Clark Fork River at Sager Lane: Station 08.5 - August, 1990-1992 and 1998-1999 (4 Hess samples per year).

	1990	1991	1992	1998	1999	Mean
Metric values						
Taxa richness	26	28	35	36	38	33
Shannon diversity	3.6	3.6	3.5	3.5	3.7	3.6
EPT/EPTC	0.74	0.80	0.70	0.84	0.70	0.76
Hydropsychinae/Trichoptera	0.78	0.60	0.35	0.72	0.73	0.64
Baetidae/Ephemeroptera	0.56	0.43	0.34	0.84	0.17	0.47
Biotic index	4.8	4.6	5.2	4.9	5.0	4.9
% Filterer	22	18	9	44	32	25
Density	1282	840	1155	1372	2380	1406
EPT richness	14	15	17	19	16	16
Metals Tolerance index	4.9	4.7	4.8	5.0	4.7	4.8
Metric scores						
Taxa richness	3	3	5	5	5	4
Shannon diversity	6	6	6	6	6	6
EPT/EPTC	6	6	6	6	6	6
Hydropsychinae/Trichoptera	6	6	6	6	6	6
Baetidae/Ephemeroptera	6	6	6	6	6	6
Biotic index	4	4	3	4	4	4
% Filterer	6	6	6	6	6	6
Density (high)	6	6	6	6	5	6
Density (low)	6	6	6	6	6	6
EPT richness	4	4	4	5	4	4
Metals Tolerance index	5	5	5	4	5	5
Total	58	58	59	60	59	59
Organic subset	16	16	15	16	15	16
Metals subset	15	15	15	15	15	15
Bioassessment						
Overall	88%	88%	89%	91%	89%	89%
Organic subset	89%	89%	83%	89%	83%	87%
Metals subset	83%	83%	83%	83%	83%	83%

C-11. Mean metric values and bioassessment scores for Clark Fork River at Deer Lodge: Station 09 - August, 1986-1999 (4 Hess samples per year).

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Metric values															
Taxa richness	24	28	26	32	26	28	28	29	26	26	31	27	30	36	28
Shannon diversity	1.7	2.3	2.3	2.3	2.1	2.9	2.3	3.9	2.2	2.7	2.4	2.4	1.9	2.8	2.4
EPT/EPTC	0.98	0.94	0.77	0.87	0.94	0.91	0.94	0.81	0.95	0.71	0.89	0.87	0.91	0.75	0.87
Hydropsychinae/Trichoptera	1.00	0.95	0.99	0.93	0.96	0.70	0.99	0.73	0.99	0.96	0.98	0.98	0.99	0.96	0.94
Baetidae/Ephemeroptera	0.99	0.93	0.63	0.42	0.78	0.71	0.98	0.68	1.00	0.97	0.99	0.96	0.99	0.69	0.84
Biotic index	4.8	4.9	4.6	5.0	5.0	4.8	5.0	4.9	4.8	5.5	5.1	4.9	5.1	5.4	5.0
% Filterer	77	69	66	67	77	52	78	42	76	71	76	69	81	61	69
Density	1410	1555	3745	2150	3183	909	2283	569	2288	2135	3308	459	2825	3918	2196
EPT richness	10	14	11	15	13	15	12	13	11	12	16	13	15	15	13
Metals Tolerance index	4.9	5.1	5.5	4.9	5.0	4.7	5.3	4.8	5.1	5.8	5.3	5.2	5.4	5.4	5.2
Metric scores															
Taxa richness	2	3	3	4	3	3	3	3	3	3	4	3	4	5	3
Shannon diversity	1	3	3	3	2	4	3	6	3	4	3	3	2	4	3
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	0	2	1	3	2	6	1	6	1	2	1	1	1	2	2
Baetidae/Ephemeroptera	1	3	6	6	6	6	1	6	0	1	1	2	1	6	3
Biotic index	4	4	4	4	4	4	4	4	4	3	4	4	4	3	4
% Filterer	0	2	2	2	0	5	0	6	0	1	0	2	0	3	2
Density (high)	6	6	3	5	4	6	5	6	5	5	3	*	4	2	5
Density (low)	6	6	6	6	6	6	6	6	6	6	6	5	6	6	6
EPT richness	3	4	3	4	3	4	3	3	3	3	4	3	4	4	3
Metals Tolerance index	5	4	4	5	4	5	4	5	4	4	4	4	4	4	4
Total	34	43	41	48	40	55	36	57	35	38	36	33	36	45	42
Organic subset	10	12	9	11	8	15	9	16	9	9	7	6	8	8	10
Metals subset	14	14	13	15	13	15	13	14	13	13	14	12	14	14	14
Bioassessment															
Overall	52%	65%	62%	73%	61%	83%	55%	86%	53%	58%	55%	55%	60%	75%	63%
Organic subset	56%	67%	50%	61%	44%	83%	50%	89%	50%	50%	39%	50%	67%	67%	56%
Metals subset	78%	78%	72%	83%	72%	83%	72%	78%	72%	72%	78%	67%	78%	78%	76%

* not calculated if density is < 550

C-12. Mean metric values and bioassessment scores for Clark Fork River above Little Blackfoot River: Station 10 - August, 1986-1999 (four Hess samples per year).

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Metric values															
Taxa richness	23	26	28	20	25	26	30	30	27	34	32	18	30	33	27
Shannon diversity	2.1	2.4	2.4	3.4	3.0	3.3	2.9	4.0	2.8	3.1	2.9	2.6	2.4	3.2	2.9
EPT/EPTC	0.92	0.91	0.62	0.83	0.77	0.91	0.92	0.81	0.91	0.65	0.91	0.83	0.92	0.83	0.84
Hydropsychinae/Trichoptera	0.99	0.94	0.81	0.53	0.73	0.44	0.95	0.60	0.93	0.94	0.93	0.92	0.94	0.87	0.82
Baetidae/Ephemeroptera	0.93	0.81	0.79	0.51	0.72	0.10	0.92	0.48	1.00	0.37	0.96	1.00	1.00	0.51	0.72
Biotic index	5.2	4.9	5.4	5.0	5.7	4.9	4.9	4.9	4.8	5.4	4.9	4.8	5.0	5.2	5.1
% Filterer	78	73	73	32	65	26	66	28	76	55	77	65	80	63	61
Density	3131	974	1688	448	1889	1615	1116	528	2388	3006	2045	195	1537	2580	1653
EPT richness	11	14	12	11	14	15	15	15	16	16	20	9	15	16	14
Metals Tolerance index	5.3	5.1	5.4	4.9	5.5	4.7	5.2	4.8	5.0	5.5	5.1	5.2	5.2	5.2	5.1
Metric scores															
Taxa richness	2	3	3	2	3	3	4	4	3	4	4	1	4	4	3
Shannon diversity	2	3	3	6	5	5	4	6	4	5	4	4	3	5	4
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	1	2	6	6	6	6	2	6	6	2	3	3	2	5	4
Baetidae/Ephemeroptera	3	6	6	6	6	6	3	6	0	6	2	0	0	6	4
Biotic index	3	4	3	4	3	4	4	4	4	3	4	4	4	3	4
% Filterer	0	1	1	6	3	6	2	6	0	5	0	3	4	3	4
Density (high)	4	6	6	*	6	6	6	*	5	4	5	3	0	3	3
Density (low)	6	6	6	4	6	6	6	5	6	6	6	*	6	5	5
EPT richness	3	4	3	3	4	4	4	4	4	4	6	2	6	6	6
Metals Tolerance index	4	4	4	5	4	5	4	5	4	4	4	4	4	4	4
Total	34	45	47	48	52	57	45	52	39	49	43	29	39	51	46
Organic subset	7	11	10	10	12	16	12	10	9	12	9	7	10	11	12
Metals subset	13	14	13	12	14	15	14	14	14	14	15	8	14	14	13
Bioassessment															
Overall	52%	68%	71%	80%	79%	86%	68%	87%	59%	74%	65%	48%	59%	77%	70%
Organic subset	39%	61%	56%	83%	67%	89%	67%	83%	50%	67%	50%	58%	56%	61%	63%
Metals subset	72%	78%	72%	67%	78%	83%	78%	78%	78%	78%	83%	44%	78%	78%	75%

* not calculated if density is < 550

C-13. Mean metric values and bioassessment scores for Little Blackfoot River: Station 10.2 - August, 1993-1999 (4 Hess samples per year).

	1993	1994	1995	1996	1997	1998	1999	Mean
Metric values								
Taxa richness	40	42	41	39	33	36	43	39
Shannon diversity	3.9	4.2	4.2	3.9	4.2	4.1	4.4	4.1
EPT/EPTC	0.32	0.58	0.55	0.61	0.55	0.51	0.38	0.50
Hydropsychinae/Trichoptera	0.14	0.62	0.38	0.71	0.52	0.70	0.42	0.50
Baetidae/Ephemeroptera	0.30	0.88	0.57	0.48	0.60	0.56	0.53	0.56
Biotic index	4.3	4.1	4.4	4.0	4.1	4.3	4.2	4.2
% Filterer	10	40	31	53	42	42	28	35
Density	460	1413	906	799	274	350	678	697
EPT richness	20	22	22	20	18	19	22	20
Metals Tolerance index	3.3	4.4	4.4	4.3	3.8	4.0	3.4	3.9
Metric scores								
Taxa richness	6	6	6	5	4	5	6	5
Shannon diversity	6	6	6	6	6	6	6	6
EPT/EPTC	3	6	6	6	6	5	4	5
Hydropsychinae/Trichoptera	6	6	6	6	6	6	6	6
Baetidae/Ephemeroptera	6	4	6	6	6	6	6	6
Biotic index	5	5	5	5	5	5	5	5
% Filterer	6	6	6	5	6	6	6	6
Density (high)	*	6	6	6	*	*	6	6
Density (low)	5	6	6	6	3	4	6	5
EPT richness	5	6	6	5	5	5	6	5
Metals Tolerance index	6	5	5	5	6	5	6	5
Total	54	62	64	61	53	53	63	59
Organic subset	11	17	17	16	11	11	17	14
Metals subset	16	17	17	16	14	14	18	16
Bioassessment								
Overall	90%	94%	97%	92%	88%	88%	95%	92%
Organic subset	92%	94%	94%	89%	92%	92%	94%	92%
Metals subset	89%	94%	94%	89%	78%	78%	100%	89%

* not calculated if density is < 550

C-14. Mean metric values and bioassessment scores for Clark Fork River at Gold Creek Bridge: Station 11 - August, 1986-1999 (4 Hess samples per year).

Metric values	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Taxa richness	29	30	35	32	25	34	37	39	39	37	32	24	37	35	33
Shannon diversity	3.3	2.9	3.8	2.9	3.2	3.6	3.4	4.3	3.6	3.6	3.5	3.0	3.4	3.1	3.4
EPT/EPTC	0.87	0.83	0.80	0.93	0.93	0.86	0.63	0.79	0.75	0.73	0.86	0.92	0.86	0.79	0.83
Hydropsychinae/Trichoptera	0.76	0.79	0.93	0.23	0.90	0.56	0.54	0.58	0.83	0.90	0.82	0.86	0.87	0.79	0.73
Baetidae/Ephemeroptera	0.51	0.49	0.40	0.20	0.92	0.18	0.24	0.37	0.84	0.60	0.95	0.96	0.87	0.71	0.57
Biotic index	4.8	5.1	4.2	4.9	5.2	5.0	5.9	4.8	4.5	5.0	4.4	4.3	4.8	5.1	4.9
% Filterer	42	63	41	23	68	34	47	31	54	53	62	76	56	51	50
Density	838	1073	396	965	457	1446	1781	558	1265	906	509	398	909	1390	921
EPT richness	15	17	18	18	13	19	17	21	24	19	19	13	20	18	18
Metals Tolerance index	4.8	5.3	4.4	4.6	5.5	5.1	5.5	4.6	4.5	5.0	4.5	4.6	4.9	5.0	4.9
Metric scores															
Taxa richness	3	4	5	4	3	4	4	5	5	5	4	2	5	5	4
Shannon diversity	5	4	6	4	5	6	6	6	6	6	6	5	6	5	5
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5
Hydropsychinae/Trichoptera	6	6	3	6	4	6	6	6	6	4	6	6	6	6	6
Baetidae/Ephemeroptera	6	6	6	6	3	6	6	6	6	6	2	5	5	6	5
Biotic index	4	4	5	4	3	4	2	5	5	4	5	5	4	4	5
% Filterer	6	3	6	6	2	6	6	6	5	5	3	5	4	4	4
Density (high)	6	6	*	6	*	6	6	6	6	6	*	0	6	5	5
Density (low)	6	6	4	6	5	6	6	6	6	6	5	4	6	6	6
EPT richness	4	4	5	5	3	5	4	5	6	5	5	3	5	5	6
Metals Tolerance index	5	4	5	5	4	4	4	5	5	4	5	5	5	4	5
Total	57	53	51	58	38	59	56	62	62	57	47	37	57	58	54
Organic subset	16	13	11	16	5	16	14	17	16	15	8	5	14	15	13
Metals subset	15	14	14	16	12	15	14	16	17	15	15	12	16	15	15
Bioassessment															
Overall	86%	80%	85%	88%	63%	89%	85%	94%	94%	86%	78%	62%	86%	88%	83%
Organic subset	89%	72%	92%	89%	42%	89%	78%	94%	89%	83%	67%	42%	78%	83%	78%
Metals subset	83%	78%	78%	89%	67%	83%	78%	89%	94%	83%	83%	67%	89%	83%	82%

* not calculated if density is < 550

C-15. Mean metric values and bioassessment scores for Flint Creek at New Chicago: Station 11.5 - August, 1993-1999 (four Hess samples per year).

	1993	1994	1995	1996	1997	1998	1999	Mean
Metric values								
Taxa richness	30	34	35	39	33	36	33	34
Shannon diversity	1.7	3.1	3.8	3.3	3.4	3.1	3.8	3.1
EPT/EPTC	0.92	0.88	0.71	0.87	0.89	0.74	0.73	0.82
Hydropsychinae/Trichoptera	0.05	0.71	0.50	0.86	0.60	0.26	0.68	0.52
Baetidae/Ephemeroptera	0.38	0.86	0.69	0.81	0.74	0.54	0.46	0.64
Biotic index	3.1	4.3	4.2	4.5	3.7	3.9	4.7	4.1
% Filterer	78	68	52	74	70	57	43	63
Density	1137	1665	1501	1731	827	964	393	1174
EPT richness	14	18	19	22	19	21	17	19
Metals Tolerance index	3.1	4.8	4.5	4.5	4.1	4.6	5.0	4.4
Metric scores								
Taxa richness	4	4	5	5	4	5	4	4
Shannon diversity	1	5	6	5	6	5	6	5
EPT/EPTC	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	6	6	6	5	6	6	6	6
Baetidae/Ephemeroptera	6	5	6	6	6	6	6	6
Biotic index	6	5	5	5	6	6	4	5
% Filterer	0	2	5	1	2	4	6	3
Density (high)	6	6	6	6	6	6	*	6
Density (low)	6	6	6	6	6	6	4	6
EPT richness	4	5	5	6	5	5	4	5
Metals Tolerance index	6	5	5	5	5	5	4	5
Total	51	55	61	56	58	60	50	56
Organic subset	12	13	16	12	14	16	10	13
Metals subset	16	16	16	17	16	16	12	16
Bioassessment								
Overall	77%	83%	92%	85%	88%	91%	83%	86%
Organic subset	67%	72%	89%	67%	78%	89%	83%	78%
Metals subset	89%	89%	89%	94%	89%	89%	67%	87%

* not calculated if density is < 550

C-16. Mean metric values and bioassessment scores for Clark Fork River at Bearmouth: Station 11.7 - August, 1993-1999 (4 Hess samples per year).

	1993	1994	1995	1996	1997	1998	1999	Mean
Metric values								
Taxa richness	44	39	35	31	23	34	42	35
Shannon diversity	3.7	2.9	2.6	2.9	2.6	3.1	4.0	3.1
EPT/EPTC	0.74	0.72	0.87	0.86	0.90	0.85	0.71	0.81
Hydropsychinae/Trichoptera	0.51	0.98	0.97	0.92	0.94	0.81	0.58	0.82
Baetidae/Ephemeroptera	0.18	0.92	0.74	0.96	0.97	0.90	0.60	0.75
Biotic index	5.1	5.2	5.0	4.8	4.7	4.9	4.8	4.9
% Filterer	14	61	74	69	73	52	34	54
Density	1808	3675	1809	1690	486	1043	2352	1838
EPT richness	20	22	19	17	13	19	22	19
Metals Tolerance index	4.7	5.0	5.0	4.9	4.9	4.9	4.2	4.8
Metric scores								
Taxa richness	6	5	5	4	2	4	6	5
Shannon diversity	6	4	4	4	4	5	6	5
EPT/EPTC	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	6	1	1	3	2	6	6	4
Baetidae/Ephemeroptera	6	3	6	2	1	4	6	4
Biotic index	4	3	4	4	4	4	4	4
% Filterer	6	3	1	2	1	5	6	3
Density (high)	6	3	6	6	*	6	5	5
Density (low)	6	6	6	6	5	6	6	6
EPT richness	5	6	5	4	3	5	6	5
Metals Tolerance index	5	4	4	5	5	5	5	5
Total	62	44	48	46	33	56	62	51
Organic subset	16	9	11	12	5	15	15	13
Metals subset	16	16	15	15	13	16	17	15
Bioassessment								
Overall	94%	67%	73%	70%	55%	85%	94%	77%
Organic subset	89%	50%	61%	67%	42%	83%	83%	68%
Metals subset	89%	89%	83%	83%	72%	89%	94%	86%

* not calculated if <550

C-17. Mean metric values and bioassessment scores for Clark Fork River at Bonita: Station 12 - August, 1986-1999 (4 Hess samples per year).

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Metric values															
Taxa richness	26	34	31	29	23	37	34	34	30	34	31	24	32	43	32
Shannon diversity	2.2	3.1	2.4	3.0	2.3	2.2	2.5	3.4	2.9	2.8	2.8	2.8	2.7	3.6	2.8
EPT/EPTC	0.95	0.64	0.76	0.83	0.91	0.91	0.85	0.84	0.80	0.87	0.82	0.91	0.91	0.91	0.85
Hydropsychinae/Trichopte	0.97	0.96	0.99	0.83	0.95	0.95	0.98	0.73	0.93	0.95	0.94	0.96	0.90	0.72	0.91
Baetidae/Ephemeroptera	0.94	0.48	0.90	0.88	0.92	0.91	0.98	0.17	0.87	0.69	0.96	0.96	0.91	0.38	0.78
Biotic index	4.7	5.1	4.7	5.2	5.0	5.0	5.2	4.7	4.8	4.8	4.9	4.5	4.7	4.4	4.8
% Filterer	63	52	69	60	72	74	67	33	64	68	65	67	64	43	62
Density	949	1228	8080	2227	1245	3153	3559	701	1926	1127	1338	293	763	1578	2012
EPT richness	13	16	15	15	13	17	15	17	16	17	16	13	19	25	16
Metals Tolerance index	4.7	4.9	5.0	5.1	5.1	5.2	5.1	4.5	4.9	4.8	4.9	4.6	4.8	4.2	4.8
Metric scores															
Taxa richness	3	4	4	3	2	5	4	4	4	4	4	2	4	6	4
Shannon diversity	3	5	3	5	3	3	3	6	4	4	4	4	4	6	4
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichopte	1	2	1	6	2	2	1	6	3	2	2	2	4	6	3
Baetidae/Ephemeroptera	2	6	4	4	3	3	1	6	5	6	2	2	3	6	4
Biotic index	4	4	4	3	4	4	3	4	4	4	4	5	4	5	4
% Filterer	3	5	2	4	1	4	2	6	3	2	3	2	3	6	3
Density (high)	6	6	0	5	6	4	3	6	6	6	6	*	6	6	5
Density (low)	6	6	6	6	6	6	6	6	6	6	6	3	6	6	6
EPT richness	3	4	4	4	3	4	4	4	4	4	4	3	5	6	4
Metals Tolerance index	5	5	4	4	4	4	4	5	5	5	5	5	5	5	5
Total	42	53	38	50	40	42	37	59	50	49	46	34	50	64	47
Organic subset	13	15	6	12	11	9	8	16	13	12	13	7	13	17	12
Metals subset	14	15	14	14	13	14	14	15	15	15	15	11	16	17	14
Bioassessment															
Overall	64%	80%	58%	76%	61%	64%	56%	89%	76%	74%	70%	57%	76%	97%	71%
Organic subset	72%	83%	33%	67%	61%	50%	44%	89%	72%	67%	72%	58%	72%	94%	65%
Metals subset	78%	83%	78%	78%	72%	78%	78%	83%	83%	83%	83%	61%	89%	94%	80%

* not calculated if <550

C-18. Mean metric values and bioassessment scores for Rock Creek near Clinton: Station 12.5 – August, 1993-1999 (4 Hess samples per year).

	1993	1994	1995	1996	1997	1998	1999	Mean
Metric values								
Taxa richness	36	35	37	36	33	40	40	37
Shannon diversity	3.0	3.8	4.0	4.0	4.1	4.2	4.3	3.9
EPT/EPTC	0.28	0.48	0.60	0.63	0.73	0.61	0.39	0.53
Hydropsychinae/Trichoptera	0.18	0.54	0.27	0.35	0.37	0.28	0.27	0.32
Baetidae/Ephemeroptera	0.26	0.26	0.34	0.34	0.43	0.23	0.38	0.32
Biotic index	3.8	3.6	3.6	3.6	3.3	3.4	4.5	3.7
% Filterer	10	17	20	29	23	25	13	20
Density	724	504	375	514	251	578	476	489
EPT richness	20	20	21	21	21	21	22	21
Metals Tolerance index	2.4	2.7	3.0	3.1	2.9	3.5	4.3	3.1
Metric scores								
Taxa richness	5	5	5	5	4	6	6	5
Shannon diversity	5	6	6	6	6	6	6	6
EPT/EPTC	3	5	6	6	6	6	4	5
Hydropsychinae/Trichoptera	6	6	6	6	6	6	6	6
Baetidae/Ephemeroptera	6	6	6	6	6	6	6	6
Biotic index	6	6	6	6	6	6	5	6
% Filterer	6	6	6	6	6	6	6	6
Density (high)	6	*	*	*	*	6	*	6
Density (low)	6	5	4	5	3	6	5	5
EPT richness	5	5	5	5	5	5	5	5
Metals Tolerance index	6	6	6	6	6	6	5	6
Total	60	56	56	57	54	65	54	57
Organic subset	18	12	12	12	12	18	11	14
Metals subset	17	16	15	16	14	17	15	16
Bioassessment								
Overall	91%	93%	93%	95%	90%	98%	90%	93%
Organic subset	100%	100%	100%	100%	100%	100%	92%	99%
Metals subset	94%	89%	83%	89%	78%	94%	83%	87%

* not calculated if density is < 550

C-19. Mean metric values and bioassessment scores for Clark Fork River at Turah: Station 13 - August, 1986-1999 (4 Hess samples per year).

Metric values	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Taxa richness	34	35	42	31	31	50	49	46	38	44	40	26	37	42	39
Shannon diversity	3.7	3.3	3.1	3.7	3.6	4.1	3.5	4.4	3.5	4.0	3.9	3.5	3.5	4.2	3.7
EPT/EPTC	0.63	0.81	0.80	0.77	0.61	0.63	0.72	0.76	0.73	0.68	0.80	0.92	0.89	0.66	0.74
Hydropsychinae/Trichoptera	0.81	0.92	0.96	0.85	0.54	0.75	0.93	0.85	0.89	0.70	0.81	0.80	0.88	0.59	0.81
Baetidae/Ephemeroptera	0.40	0.68	0.83	0.48	0.22	0.40	0.87	0.34	0.59	0.53	0.55	0.50	0.51	0.22	0.51
Biotic index	4.8	4.7	4.4	4.7	5.1	5.0	4.8	4.0	4.3	4.9	4.3	3.8	4.2	4.2	4.5
% Filterer	44	68	65	50	27	34	56	22	51	44	57	54	54	25	47
Density	1539	1708	5636	1725	2145	2164	2757	483	1078	1941	1354	226	674	1111	1753
EPT richness	17	19	23	17	16	26	26	26	20	25	23	17	22	25	21
Metals Tolerance index	5.0	4.8	4.8	4.6	5.3	5.1	4.7	3.5	4.2	5.2	4.2	4.0	4.3	3.9	4.5
Metric scores															
Taxa richness	4	5	6	4	4	6	6	6	5	6	6	3	5	6	5
Shannon diversity	6	5	5	6	6	6	6	6	6	6	6	6	6	6	6
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	6	3	2	5	6	6	6	5	4	6	6	6	4	6	6
Baetidae/Ephemeroptera	6	6	6	6	6	6	5	6	6	6	6	6	6	6	5
Biotic index	4	4	5	4	4	4	4	5	5	4	5	6	5	6	6
% Filterer	6	2	3	6	6	6	4	6	5	6	5	6	5	5	5
Density (high)	6	6	0	6	5	5	4	6	5	4	4	5	5	6	5
Density (low)	6	6	6	6	6	6	6	*	6	6	6	*	6	6	5
EPT richness	4	5	6	4	4	6	6	6	6	6	6	2	6	6	6
Metals Tolerance index	4	5	5	5	4	4	5	6	5	6	5	5	5	6	5
Total	58	53	50	58	57	61	55	57	59	62	62	49	60	65	58
Organic subset	16	12	8	16	15	15	12	11	16	16	15	11	16	17	14
Metals subset	14	16	17	15	14	16	17	17	16	16	17	11	17	18	16
Bioassessment															
Overall	88%	80%	76%	88%	86%	92%	83%	95%	89%	94%	94%	82%	91%	98%	88%
Organic subset	89%	67%	44%	89%	83%	83%	67%	92%	89%	89%	83%	92%	89%	94%	82%
Metals subset	78%	89%	94%	83%	78%	89%	94%	94%	89%	89%	94%	61%	94%	100%	88%

* not calculated if <550

C-20. Mean metric values and bioassessment scores for Blackfoot River at USGS:
Station 14 - August, 1986-1999 (4 Hess samples per year).

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Metric values															
Taxa richness	21	31	36	28	31	30	41	37	39	42	35	32	36	35	34
Shannon diversity	4.0	3.3	4.0	4.0	4.1	4.1	2.8	3.9	4.0	3.6	3.9	3.6	3.9	4.2	3.8
EPT/EPTC	0.76	0.37	0.59	0.77	0.88	0.88	0.20	0.50	0.68	0.54	0.91	0.95	0.79	0.68	0.68
Hydropsychinae/Trichoptera	0.62	0.84	0.73	0.79	0.74	0.65	0.77	0.64	0.78	0.64	0.74	0.80	0.75	0.46	0.71
Baetidae/Ephemeroptera	0.49	0.49	0.71	0.37	0.28	0.47	0.50	0.41	0.44	0.35	0.75	0.67	0.32	0.29	0.47
Biotic index	3.4	4.8	4.8	3.7	3.5	3.6	4.4	4.1	4.0	3.7	3.7	3.9	3.5	3.5	3.9
% Filterer	19	17	32	42	45	30	7	19	37	26	55	66	51	30	34
Density	65	414	382	192	408	170	975	284	511	535	426	291	531	268	389
EPT richness	14	18	20	17	20	20	23	22	22	24	21	19	24	21	20
Metals Tolerance index	3.0	2.9	3.8	3.4	3.6	3.7	2.9	3.7	3.7	2.6	3.8	3.9	3.4	3.1	3.4
Metric scores															
Taxa richness	2	4	5	3	4	4	6	5	5	6	5	4	5	5	5
Shannon diversity	6	5	6	6	6	6	4	6	6	6	6	6	6	6	6
EPT/EPTC	6	4	6	6	6	6	2	5	6	5	6	6	6	6	5
Hydropsychinae/Trichoptera	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Baetidae/Ephemeroptera	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Biotic index	6	4	4	6	6	6	5	5	5	6	6	6	6	6	6
% Filterer	6	6	6	6	6	6	6	6	6	6	5	2	5	6	6
Density (high)	*	*	*	*	*	*	6	*	*	*	*	*	*	*	6
Density (low)	1	4	4	2	4	2	6	3	5	5	4	3	5	3	4
EPT richness	4	5	5	4	5	5	6	6	6	6	5	5	6	5	5
Metals Tolerance index	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Total	49	50	54	51	55	53	59	54	57	58	55	50	57	55	54
Organic subset	12	10	10	12	12	12	17	11	11	12	11	8	11	12	12
Metals subset	11	15	15	12	15	13	18	15	17	17	15	14	17	14	15
Bioassessment															
Overall	82%	83%	90%	85%	92%	88%	89%	90%	95%	97%	92%	83%	95%	92%	89%
Organic subset	100%	83%	83%	100%	100%	100%	94%	92%	92%	100%	92%	67%	92%	100%	92%
Metals subset	61%	83%	83%	67%	83%	72%	100%	83%	94%	83%	83%	78%	94%	78%	83%

* not calculated if density is < 550

C-21. Mean metric values and bioassessment scores for Clark Fork River above Missoula: Station 15.5 - August, 1989-1999 (4 Hess samples per year).

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Metric values												
Taxa richness	29	25	32	39	36	37	47	38	29	36	36	35
Shannon diversity	3.4	2.8	3.2	3.7	4.0	3.5	3.5	3.6	2.9	3.1	4.2	3.5
EPT/EPTC	0.84	0.91	0.83	0.65	0.85	0.76	0.88	0.92	0.95	0.92	0.84	0.85
Hydropsychinae/Trichoptera	0.86	0.92	0.94	0.89	0.90	0.97	0.95	0.93	0.95	0.91	0.56	0.89
Baetidae/Ephemeroptera	0.71	0.51	0.82	0.96	0.30	0.66	0.40	0.57	0.44	0.65	0.28	0.57
Biotic index	4.3	4.1	4.5	5.0	3.8	4.6	4.3	4.3	4.3	4.3	3.8	4.3
% Filterer	67	79	64	53	48	58	67	66	79	75	49	64
Density	341	468	560	1841	384	1292	2090	795	631	1257	411	915
EPT richness	18	16	16	21	21	20	27	23	17	22	22	20
Metals Tolerance index	4.3	4.0	4.6	5.2	3.4	4.7	4.3	4.3	4.4	4.4	3.8	4.3
Metric scores												
Taxa richness	3	3	4	5	5	5	6	5	3	5	5	4
Shannon diversity	6	4	5	6	6	6	6	6	4	5	6	5
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	5	3	2	4	4	1	2	3	2	3	6	3
Baetidae/Ephemeroptera	6	6	6	2	6	6	6	6	6	6	6	6
Biotic index	5	5	5	4	6	4	5	5	5	5	6	5
% Filterer	2	0	3	5	6	4	2	2	0	1	6	3
Density (high)	*	*	6	6	*	6	5	6	6	6	*	6
Density (low)	3	5	6	6	4	6	6	6	6	6	4	5
EPT richness	5	4	4	5	5	5	6	6	4	6	6	5
Metals Tolerance index	5	5	5	4	6	5	5	5	5	5	6	5
Total	46	41	52	53	54	54	55	56	47	54	57	54
Organic subset	7	5	14	15	12	14	12	13	11	12	12	14
Metals subset	13	14	15	15	15	16	17	17	15	17	16	15
Bioassessment												
Overall	77%	68%	79%	80%	90%	82%	83%	85%	71%	82%	95%	81%
Organic subset	58%	42%	78%	83%	100%	78%	67%	72%	61%	67%	100%	73%
Metals subset	72%	78%	83%	83%	83%	89%	94%	94%	83%	94%	89%	86%

* not calculated if density is < 550

C-22. Mean metric values and bioassessment scores for Clark Fork River at Shuffields: Station 18 - August, 1986-1999 (4 Hess samples per year).

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Metric values															
Taxa richness	29	38	34	27	30	34	38	45	39	42	39	32	39	42	36
Shannon diversity	2.9	4.0	3.2	3.5	3.5	3.6	2.9	4.0	3.1	3.8	3.6	3.4	2.7	3.7	3.4
EPT/EPTC	0.90	0.79	0.90	0.82	0.86	0.75	0.91	0.70	0.84	0.60	0.90	0.86	0.31	0.77	0.78
Hydropsychinae/Trichoptera	0.96	0.75	0.71	0.92	0.73	0.81	0.83	0.73	0.92	0.81	0.85	0.86	0.75	0.37	0.79
Baetidae/Ephemeroptera	0.80	0.93	0.72	0.50	0.67	0.53	0.67	0.59	0.60	0.77	0.66	0.30	0.40	0.40	0.61
Biotic index	4.3	4.8	4.1	4.5	4.3	4.5	4.7	4.6	4.8	5.1	4.2	4.3	6.2	5.1	4.7
% Filterer	73	43	48	63	67	54	72	24	73	35	71	71	18	26	53
Density	584	1052	1360	830	932	627	1543	848	1725	1992	706	353	1943	1271	1126
EPT richness	16	20	18	16	19	19	22	22	22	22	25	19	21	23	20
Metals Tolerance index	4.2	4.6	4.7	4.5	4.2	4.7	4.4	4.6	4.7	5.3	4.1	4.1	6.9	4.4	4.7
Metric scores															
Taxa richness	3	5	4	3	4	4	5	6	5	6	5	4	5	6	5
Shannon diversity	4	6	5	6	6	6	4	6	5	6	6	6	4	6	5
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6	3	6	6
Hydropsychinae/Trichoptera	2	6	6	3	6	6	6	6	3	6	5	5	6	6	5
Baetidae/Ephemeroptera	6	3	6	6	6	6	6	6	6	6	6	6	6	6	6
Biotic index	5	4	5	5	5	5	4	4	4	4	5	5	2	4	4
% Filterer	1	6	6	3	2	5	1	6	1	6	1	1	6	6	4
Density (high)	6	6	6	6	6	6	6	6	6	6	6	*	6	6	6
Density (low)	6	6	6	6	6	6	6	6	6	6	6	4	6	6	6
EPT richness	4	5	5	4	5	5	6	6	6	6	6	5	5	6	5
Metals Tolerance index	5	5	5	5	5	5	5	5	5	4	5	5	3	5	5
Total	48	58	60	53	57	60	55	63	53	62	57	47	52	63	56
Organic subset	12	16	17	14	13	16	11	16	11	16	12	6	14	16	14
Metals subset	15	16	16	15	16	16	17	17	17	16	17	14	14	17	16
Bioassessment															
Overall	73%	88%	91%	80%	86%	91%	83%	95%	80%	94%	86%	78%	79%	95%	86%
Organic subset	67%	89%	94%	78%	72%	89%	61%	89%	61%	89%	67%	50%	78%	89%	77%
Metals subset	83%	89%	89%	83%	89%	89%	94%	94%	94%	89%	94%	78%	78%	94%	88%

C-23. Mean metric values and bioassessment scores for Bitterroot River near mouth: Station 19 - August, 1986-1999 (4 Hess samples per year).

Metric values	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Taxa richness	31	35	39	33	30	36	34	37	29	41	34	36	39	36	35
Shannon diversity	3.5	3.7	3.4	3.8	3.5	3.8	3.1	4.3	2.9	3.9	3.3	3.6	3.6	4.0	3.6
EPT/EPTC	0.83	0.77	0.81	0.80	0.91	0.72	0.68	0.73	0.78	0.81	0.91	0.92	0.87	0.84	0.81
Hydropsychinae/Trichoptera	0.96	0.91	0.96	0.73	0.83	0.89	0.92	0.73	0.90	0.81	0.91	0.92	0.83	0.84	0.81
Baetidae/Ephemeroptera	0.65	0.55	0.84	0.35	0.48	0.34	0.63	0.18	0.55	0.68	0.82	0.71	0.83	0.44	0.42
Biotic index	4.7	4.8	4.6	4.2	4.4	4.6	4.9	4.0	4.7	0.08	0.69	0.15	0.21	0.12	4.4
% Filterer	65	63	63	58	66	56	69	35	81	4.0	4.3	4.0	4.4	3.6	60
Density	890	1085	1243	792	936	810	1421	334	1870	45	70	64	56	46	964
EPT richness	16	20	21	19	17	18	18	21	14	938	1055	461	1242	425	19
Metals Tolerance index	4.7	4.4	4.8	3.8	4.4	4.9	4.7	3.1	4.6	22	18	18	22	20	4.3
										3.9	4.4	4.1	4.3	3.7	

Metric scores	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Taxa richness	4	5	5	4	4	5	4	5	3	6	4	5	5	5	5
Shannon diversity	6	6	6	6	6	6	5	6	4	6	5	6	6	6	6
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	2	3	2	6	6	4	3	6	4	6	6	6	6	6	6
Baetidae/Ephemeroptera	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5
Biotic index	4	4	4	5	5	4	4	5	6	5	5	5	5	6	6
% Filterer	3	3	3	4	2	4	2	6	0	6	2	3	4	6	5
Density (high)	6	6	6	6	6	6	6	*	6	6	6	*	6	*	3
Density (low)	6	6	6	6	6	6	6	3	6	6	6	5	6	4	6
EPT richness	4	5	5	5	4	5	5	5	4	6	5	5	6	5	5
Metals Tolerance index	5	5	5	6	5	5	5	6	5	6	5	5	5	6	5
Total	52	55	54	60	56	57	52	54	48	65	56	52	61	56	57
Organic subset	13	13	13	15	13	14	12	11	10	17	13	8	15	12	14
Metals subset	15	16	16	17	15	16	16	14	15	18	16	15	17	15	16

Bioassessment	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Overall	79%	83%	82%	91%	85%	86%	79%	90%	73%	98%	85%	87%	92%	93%	85%
Organic subset	72%	72%	72%	83%	72%	78%	67%	92%	56%	94%	72%	67%	83%	100%	75%
Metals subset	83%	89%	89%	94%	83%	89%	89%	78%	83%	100%	89%	83%	94%	83%	88%

* not calculated if < 550

C-24. Mean metric values and bioassessment scores for Clark Fork River at Harper Bridge: Station 20, August, 1986-1999 (4 Hess samples per year).

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Metric values															
Taxa richness	28	33	31	29	28	32	39	31	31	41	33	31	36	37	33
Shannon diversity	2.9	3.2	2.5	3.5	3.1	3.3	3.2	1.4	3.2	3.1	2.9	3.6	2.4	4.2	3.0
EPT/EPTC	0.92	0.76	0.84	0.59	0.74	0.78	0.53	0.81	0.77	0.78	0.90	0.91	0.86	0.72	0.78
Hydropsychinae/Trichopte	0.95	0.92	0.98	0.93	0.96	0.93	0.93	0.98	0.90	0.91	0.93	0.80	0.94	0.55	0.90
Baetidae/Ephemeroptera	0.86	0.84	0.85	0.66	0.72	0.62	0.83	0.75	0.68	0.43	0.77	0.40	0.39	0.28	0.65
Biotic index	4.7	4.9	4.5	5.4	5.2	4.7	5.4	4.9	4.7	4.9	4.6	4.0	4.8	4.5	4.8
% Filterer	68	68	74	52	64	61	47	90	67	63	71	62	74	42	65
Density	810	1519	4786	1391	1362	795	4369	4259	1658	2436	882	255	1594	364	1891
EPT richness	16	15	16	15	15	16	19	18	16	20	18	20	22	21	18
Metals Tolerance index	4.7	4.8	5.1	5.5	5.1	4.7	5.7	4.9	4.4	4.8	4.7	3.9	4.8	3.3	4.7
Metric scores															
Taxa richness	3	4	4	3	3	4	5	4	4	6	4	4	5	5	4
Shannon diversity	4	5	3	6	5	5	5	1	5	5	4	6	3	6	5
EPT/EPTC	6	6	6	6	6	6	5	6	6	6	6	6	6	6	6
Hydropsychinae/Trichopte	2	3	1	3	2	3	3	1	4	3	3	6	2	6	3
Baetidae/Ephemeroptera	5	6	5	6	6	6	6	6	6	6	6	6	6	6	6
Biotic index	4	4	5	3	3	4	3	4	4	4	4	5	4	5	4
% Filterer	2	2	1	5	3	3	6	0	2	3	1	3	1	6	3
Density (high)	6	6	1	6	6	6	2	2	6	5	6	*	6	*	5
Density (low)	6	6	6	6	6	6	6	6	6	6	6	3	6	4	6
EPT richness	4	4	4	4	4	4	5	5	4	5	5	5	6	5	5
Metals Tolerance index	5	5	4	4	4	5	4	5	5	5	5	6	5	6	5
Total	47	51	40	52	48	52	50	40	52	54	50	50	50	55	49
Organic subset	12	12	7	14	12	13	11	6	12	12	11	8	11	11	11
Metals subset	15	15	14	14	14	15	15	16	15	16	16	14	17	15	15
Bioassessment															
Overall	71%	77%	61%	79%	73%	79%	76%	61%	79%	82%	76%	83%	76%	92%	76%
Organic subset	67%	67%	39%	78%	67%	72%	61%	33%	67%	67%	61%	67%	61%	92%	64%
Metals subset	83%	83%	78%	78%	78%	83%	83%	89%	83%	89%	89%	78%	94%	83%	84%

C-25. Mean metric values and bioassessment scores for Clark Fork River at Huson: Station 22 - August, 1986-1999 (four Hess samples per year except eight samples in 1998).

Metric values	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Taxa richness	28	42	33	32	30	33	40	32	29	31	27	20	33	33	32
Shannon diversity	2.5	3.4	2.8	3.9	3.7	2.7	3.3	3.0	2.5	2.9	3.4	3.0	3.1	4.0	3.2
EPT/EPTC	0.94	0.79	0.82	0.63	0.70	0.83	0.50	0.73	0.70	0.68	0.82	0.96	0.85	0.79	0.77
Hydropsychinae/Trichoptera	0.99	0.93	0.97	0.86	0.79	0.99	0.94	0.66	0.81	0.86	0.95	0.52	0.90	0.79	0.82
Baetidae/Ephemeroptera	0.94	0.40	0.81	0.45	0.29	0.78	0.87	0.47	0.59	0.47	0.70	0.68	0.53	0.34	0.58
Biotic index	4.8	4.9	4.6	4.9	4.3	4.8	5.3	4.6	4.6	4.7	4.8	3.2	4.6	4.5	4.6
% Filterer	75	60	71	43	40	71	57	57	77	70	58	42	55	23	57
Density	1396	1452	2680	819	516	882	2902	806	4296	1205	476	141	507	308	1313
EPT richness	16	21	17	18	17	17	20	15	15	15	16	12	18	19	17
Metals Tolerance index	4.9	4.9	4.9	4.5	4.0	4.9	5.0	4.3	4.5	4.7	4.7	3.8	4.5	3.2	4.5
Metric scores															
Taxa richness	3	6	4	4	4	4	6	4	3	4	3	2	4	4	4
Shannon diversity	3	6	4	6	6	4	5	5	3	4	6	5	5	6	5
EPT/EPTC	6	6	6	6	6	6	5	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	1	3	1	5	6	1	2	6	6	6	6	6	6	6	6
Baetidae/Ephemeroptera	2	6	6	6	6	6	5	6	6	5	2	6	4	6	4
Biotic index	4	4	4	4	5	4	3	4	4	6	4	6	6	6	6
% Filterer	1	4	1	6	6	1	4	4	0	2	4	6	4	5	4
Density (high)	6	6	4	6	*	6	4	6	2	6	*	*	*	*	4
Density (low)	6	6	6	6	5	6	6	6	6	6	5	1	3	5	5
EPT richness	4	5	4	5	4	4	5	4	4	4	5	3	5	3	5
Metals Tolerance index	5	5	5	5	5	5	4	5	5	5	5	6	5	5	5
Total	41	57	45	59	53	47	49	56	45	52	45	47	49	53	50
Organic subset	11	14	9	16	11	11	11	14	6	12	8	12	9	11	11
Metals subset	15	16	15	16	14	15	15	15	15	15	14	10	15	14	15
Bioassessment															
Overall	62%	86%	68%	89%	88%	71%	74%	85%	68%	79%	75%	78%	82%	88%	78%
Organic subset	61%	78%	50%	89%	92%	61%	61%	78%	33%	67%	67%	100%	75%	92%	72%
Metals subset	83%	83%	83%	89%	78%	83%	83%	83%	83%	83%	78%	56%	83%	78%	81%

* not calculated if density is < 550

C-26. Mean metric values and bioassessment scores for Clark Fork River near Superior: Station 24 - August, 1986-1999 (four Hess samples per year).

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Metric values															
Taxa richness	31	34	36	28	33	33	44	34	28	35	28	24	35	35	33
Shannon diversity	3.5	3.5	3.3	2.8	3.8	3.8	3.7	3.9	3.1	3.3	2.7	2.6	2.9	3.6	3.3
EPT/EPTC	0.84	0.76	0.80	0.84	0.81	0.83	0.70	0.65	0.82	0.83	0.94	0.95	0.91	0.84	0.82
Hydropsychinae/Trichoptera	0.73	0.96	0.97	0.91	0.86	0.90	0.90	0.86	0.93	0.77	0.91	0.92	0.91	0.78	0.88
Baetidae/Ephemeroptera	0.80	0.54	0.61	0.42	0.53	0.70	0.19	0.36	0.58	0.21	0.60	0.71	0.44	0.33	0.50
Biotic index	4.4	5.0	4.7	4.8	4.6	4.5	4.9	4.4	4.5	4.1	4.5	4.3	4.7	4.3	4.5
% Filterer	55	61	61	74	56	54	49	53	74	64	78	84	75	59	64
Density	537	1100	2738	1088	725	463	955	975	2084	1102	873	843	848	757	1078
EPT richness	18	17	20	17	22	19	26	18	16	20	15	14	22	22	19
Metals Tolerance index	3.9	4.6	4.4	4.7	4.4	4.7	4.6	4.0	4.5	3.9	4.6	4.3	4.8	4.2	4.4
Metric scores															
Taxa richness	4	4	5	3	4	4	6	4	3	5	3	2	5	5	4
Shannon diversity	6	6	5	4	6	6	6	6	5	5	4	4	4	6	5
EPT/EPTC	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Hydropsychinae/Trichoptera	6	2	1	3	5	4	4	5	3	6	3	3	3	6	4
Baetidae/Ephemeroptera	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Biotic index	5	4	4	4	4	5	4	5	5	5	5	5	4	5	5
% Filterer	5	3	3	1	4	5	6	5	1	3	0	0	1	4	3
Density (high)	*	6	4	6	6	*	6	6	5	6	6	6	6	6	6
Density (low)	5	6	6	6	6	5	6	6	6	6	6	6	6	6	6
EPT richness	5	4	5	4	6	5	6	5	4	5	4	4	6	6	5
Metals Tolerance index	6	5	5	5	5	5	5	6	5	6	5	5	5	5	5
Total	54	52	50	48	58	51	61	60	49	59	48	47	52	61	54
Organic subset	10	13	11	11	14	10	16	16	11	14	11	11	11	15	12
Metals subset	16	15	16	15	17	15	17	17	15	17	15	15	17	17	16
Bioassessment															
Overall	90%	79%	76%	73%	88%	85%	92%	91%	74%	89%	73%	71%	79%	92%	82%
Organic subset	83%	72%	61%	61%	78%	83%	89%	89%	61%	78%	61%	61%	61%	83%	73%
Metals subset	89%	83%	89%	83%	94%	83%	94%	94%	83%	94%	83%	83%	94%	94%	89%

* not calculated if density is < 550

C-27. Mean metric values and bioassessment scores for Clark Fork River above the Flathead River: Station 25 - August, 1986-1999 (four Hess samples per year).

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Metric values															
Taxa richness	25	31	37	27	29	35	40	37	36	42	37	25	33	38	34
Shannon diversity	3.4	3.3	3.3	3.4	3.8	3.8	3.7	3.4	3.3	4.0	3.2	2.7	3.4	3.9	3.5
EPT/EPTC	0.79	0.66	0.66	0.61	0.58	0.71	0.64	0.55	0.46	0.70	0.66	0.69	0.81	0.67	0.66
Hydropsychinae/Trichoptera	0.70	0.90	0.96	0.98	0.91	0.96	0.91	0.95	0.91	0.76	0.95	0.93	0.78	0.77	0.88
Baetidae/Ephemeroptera	0.58	0.60	0.60	0.41	0.33	0.31	0.22	0.21	0.21	0.17	0.39	0.27	0.32	0.22	0.35
Biotic index	4.5	5.0	4.8	4.9	4.9	4.7	5.0	4.9	5.1	4.4	4.9	4.7	4.6	4.6	4.8
% Filterer	50	53	57	64	63	55	54	72	64	45	76	88	58	54	61
Density	249	1102	2097	1030	672	633	1355	684	1955	654	739	558	918	350	928
EPT richness	14	15	20	15	17	16	20	19	18	23	20	15	21	21	18
Metals Tolerance index	3.7	3.9	3.9	4.3	3.8	4.6	4.7	3.1	3.3	3.2	3.5	3.3	4.3	3.0	3.8
Metric scores															
Taxa richness	3	4	5	3	3	5	6	5	5	6	5	3	4	5	4
Shannon diversity	6	5	5	6	6	6	6	6	5	6	5	4	6	6	6
EPT/EPTC	6	6	6	6	6	6	6	6	5	6	6	6	6	6	6
Hydropsychinae/Trichoptera	6	4	2	1	3	2	3	2	3	6	2	3	6	6	4
Baetidae/Ephemeroptera	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Biotic index	5	4	4	4	4	4	4	4	4	5	4	4	4	4	4
% Filterer	6	5	4	3	3	5	5	1	3	6	0	0	4	5	4
Density (high)	*	6	5	6	6	6	6	6	6	6	6	6	6	*	6
Density (low)	2	6	6	6	6	6	6	6	6	6	6	6	6	4	6
EPT richness	4	4	5	4	4	4	5	5	5	6	5	4	5	5	5
Metals Tolerance index	6	6	6	5	6	5	5	6	6	6	6	6	5	6	6
Total	50	56	54	50	53	55	58	53	54	65	51	48	58	53	54
Organic subset	11	15	13	13	13	15	15	11	13	17	10	10	14	9	13
Metals subset	12	16	17	15	16	15	16	17	17	18	17	16	16	15	16
Bioassessment															
Overall	83%	85%	82%	76%	80%	83%	88%	80%	82%	98%	77%	73%	88%	88%	83%
Organic subset	92%	83%	72%	72%	72%	83%	83%	61%	72%	94%	56%	56%	78%	75%	75%
Metals subset	67%	89%	94%	83%	89%	83%	89%	94%	94%	100%	94%	89%	89%	83%	88%

* not calculated if density is < 550

C-28. Mean metric values and bioassessment scores for Clark Fork River above Thompson Falls Reservoir: Station 27 - August, 1987-1999 (four Hess samples per year).

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Metric values														
Taxa richness	26	26	21	29	31	23	27	25	25	n	24	26	34	26
Shannon diversity	2.9	2.8	2.6	2.9	2.9	2.7	3.0	2.8	2.7	o	4.0	3.4	3.9	3.1
EPT/EPTC	0.79	0.91	0.58	0.83	0.87	0.79	0.51	0.93	0.86		0.61	0.69	0.78	0.76
Hydropsychinae/Trichoptera	0.96	0.94	0.98	0.91	0.93	0.98	0.88	0.83	0.83	q	0.72	0.90	0.66	0.88
Baetidae/Ephemeroptera	0.34	0.31	0.24	0.54	0.37	0.04	0.22	-0.09	0.31	u	0.21	0.17	0.32	0.26
Biotic index	5.2	5.0	5.3	4.8	4.7	5.1	5.3	4.2	4.4	a	5.1	5.2	4.5	4.9
% Filterer	67	78	75	76	69	73	66	64	71	l	33	45	51	64
Density	525	851	838	520	486	627	313	463	287	i	84	240	254	457
EPT richness	12	12	9	17	18	9	11	13	12	t	12	13	17	13
Metals Tolerance index	4.9	4.5	4.2	4.2	5.1	3.9	2.8	4.0	4.0	a i	4.1	4.2	3.5	4.1
Metric scores														
Taxa richness	3	3	2	3	4	2	3	3	3	v	2	3	4	3
Shannon diversity	4	4	4	4	4	4	5	4	4	e	6	6	6	5
EPT/EPTC	6	6	6	6	6	6	5	6	6		6	6	6	6
Hydropsychinae/Trichoptera	2	2	1	3	3	1	4	6	6	d	6	4	6	4
Baetidae/Ephemeroptera	6	6	6	6	6	6	6	6	6	a	6	6	6	6
Biotic index	3	4	3	4	4	4	3	5	5	t	4	3	5	4
% Filterer	2	0	1	0	2	1	2	3	1	a	6	6	5	2
Density (high)	*	6	6	*	*	6	*	*	*		*	*	*	6
Density (low)	5	6	6	5	5	6	3	5	3		1	2	3	4
EPT richness	3	3	2	4	5	2	3	3	3		3	3	4	3
Metals Tolerance index	5	5	5	5	4	6	6	6	6		5	5	6	5
Total	39	45	42	40	43	44	40	47	43		45	44	51	44
Organic subset	5	10	10	4	6	11	5	8	6		10	9	10	8
Metals subset	13	14	13	14	14	14	12	14	12		9	10	13	13
Bioassessment														
Overall	65%	68%	64%	67%	72%	67%	67%	78%	72%		75%	73%	85%	71%
Organic subset	42%	56%	56%	33%	50%	61%	42%	67%	50%		83%	75%	83%	58%
Metals subset	72%	78%	72%	78%	78%	78%	67%	78%	67%		50%	56%	72%	70%

* not calculated if density is < 550